CONSENT DECREE STATUS REPORT

FOR THE REPORTING PERIOD

July 9, 2018 – January 9, 2019

SUBMITTED PURSUANT TO SECTION XI, PARAGRAPH 58 OF THE CONSENT DECREE ENTERED IN

UNITED STATES ET AL., V. MARKWEST LIBERTY MIDSTREAM & RESOURCES, L.L.C., ET AL.

CIVIL ACTION NO 18-520 (W.D. PENNSYLVANIA) (FILED JULY 9, 2018)

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1. INTRODUCTION

In accordance, with Paragraph 58 of Section XI of the Consent Decree entered in the *United States of America, et al v. MarkWest Liberty Midstream & Resources, L.L.C, et al.*, Western District of Pennsylvania, Civil Action No. 18-520 (filed July 9, 2018), MarkWest Liberty Midstream & Resources, L.L.C., and Ohio Gathering Company, L.L.C. submits this Status report for the first reporting period, covering the time period from July 9, 2018 through January 9, 2019. This report contains the following information:

- The date(s) of replacement of any Dehydrator Flares at compressor stations listed in Appendix 2 of this Decree, as required by Paragraph 13. *(Consent Decree Paragraph 58.a)*
- The date of the replacement of the candlestick flare at the Smith Tee facility, as required by Paragraph 15. *(CD Paragraph 58.b)*
- The status of the closure of launchers and receivers located at the Drugmand, Stewart Route 50, and Graham Header facilities. If the facility is closed, provide the date the facility ceased operation, as required by Paragraph 17. *(CD Paragraph 58.c)*
- The date of any SEP Completion Reports submitted under Paragraph 30. Also, identify for which SEP the completion report was submitted. *(CD Paragraph 58.d)*
- For any new launcher or receiver constructed after the Effective Date but prior to the Termination Date of this Decree, as provided in Paragraph 20, provide the date(s) and location of any: *(CD Paragraph 58.e)*
    - i. Jumper Lines installed; *(CD Paragraph 58.e.i)*
    - ii. Pig Ramps installed; *(CD Paragraph 58.e.ii)*
    - iii. An explanation for not installing Jumper Lines or Pig Ramps; *(CD Paragraph 58.e.iii)*
    - iv. Any instances where a Jumper Line was not used prior to opening the hatch; *(CD Paragraph 58.e.iv)*
    - v. An explanation for not using shorter barrels at high pressure launchers and receivers. *(CD Paragraph 58.e.v)*
- For each launcher or receiver subject to the requirements of Paragraphs 12, 14, 18 and 19, provide, as applicable to each specific pig launcher or receiver, the date(s) and locations of: *(CD Paragraph 58.f)*
    - i. Jumper Lines installed; *(CD Paragraph 58.f.i)*
    - ii. Pig Ramps installed; and *(CD Paragraph 58.f.ii)*
    - iii. Liquid Containment vessels installed. *(CD Paragraph 58.f.iii)*
- Copies of each permit application submitted to PADEP pursuant to Paragraph 43. *(CD Paragraph 58.g)*
- Copies of each permit application or application seeking coverage under a general permit submitted to OEPA pursuant to Paragraphs 45 and 46. *(CD Paragraph 58.h)*
- Date on which OEPA granted any permit or approval to operate under a general permit in response to applications submitted pursuant to Paragraphs 45 and 46. *(CD Paragraph 58.i)*
- Date that any Jumper Line was installed pursuant to the requirements of Paragraph 22. *(CD Paragraph 58.j)*
- Dates that Pig Ramps were installed for each receiver as required by Paragraph 21. *(CD Paragraph 58.k)*
- Dates that a Mobile Flare was operated as required by Paragraphs 18 and 19. *(CD Paragraph 58.l)*
- Status update for the HCS and Harmon Creek monitoring SEPs as set forth in Paragraph 28.b. and c. until those SEPs are completed. *(CD Paragraph 58.m)*

2. REPLACEMENT OF DEHYDRATOR FLARES AT COMPRESSOR STATIONS

CD Requirement:

(CD Paragraph 13) Pennsylvania Compressor Station Dehydrator Flares. At the MarkWest Compressor Stations identified in Appendix 2, MarkWest shall replace existing dehydrator flares with enclosed air-assisted flares. The replacement enclosed air-assisted flare system shall include a 3 horsepower blower (with a variable frequency drive), a single point burner tip, a gas enrichment stream and Shutdown/startup control logic panels, and shall raise regenerator off-gas Btu value to ensure a clean bum. These flares shall achieve a minimum 98% destruction and removal efficiency ("DRE").

Status Report Information:

The date(s) of replacement of any Dehydrator Flares at compressor stations listed in Appendix 2 of this Decree, as required by Paragraph 13. *(Consent Decree Paragraph 58.a)*

Reporting Period Status:

While no date for completion was established in the Consent Decree, MarkWest completed some installations prior to the Effective Date (July 9, 2018). Additional replacement work continued, however none was completed during the reporting period. For the purpose of this status report, the date is shown as "In Progress". The aforementioned information is provided in Table II-1 below:

Table II-1

Facility	Date of Replacement
Three Brothers CS	Prior to 7/9/2018
Carpenter CS	In Progress
Royal Oak CS	In Progress
Smith CS	Prior to 7/9/2018
Trillith CS	In Progress
Welling CS	Prior to 7/9/2018

3. REPLACEMENT OF THE CANDLESTICK FLARE AT THE SMITH TEE FACILITY

CD Requirement:

(CD Paragraph 15) At the Smith Tee Stand-Alone Facility (the location of which is identified in Appendix 3) in Pennsylvania, MarkWest shall replace the existing flare with a new "candlestick" flare. The replacement candlestick flare system shall be designed to (a) provide smokeless and low heat radiation flaring, (b) maintain its pilot light in winds up to 50 mph, and (c) generate a hydrocarbon gas-air mixture using an air inspirator ignition.

Status Report Information:

The date of the replacement of the candlestick flare at the Smith Tee facility, as required by Paragraph 15. *(CD Paragraph 58.b)*

Reporting Period Status:

Due to concerns expressed to MarkWest by neighbors, MarkWest petitioned the United States Environmental Protection Agency (USEPA) to use a ZEVAC emission recovery system at the locations identified in Appendix 3 of the Consent Decree, as well as, other stand-alone launcher/receiver sites. MarkWest is currently awaiting a response from USEPA and therefore does not have any activity to report for the reporting period.

4. STATUS OF CLOSURE OF LAUNCHER AND RECEIVERS LOCATED AT THE DRUGMAND, STEWART ROUTE 50, AND GRAHAM HEADER FACILITIES

CD Requirement:

(CD Paragraph 17) No later than twelve (12) months after the Effective Date, MarkWest shall permanently close and cease operations of all launchers and receivers located at the Drugmand Station (located at 40.326675, -80.297640) and Stewart Route 50 Station (located at 40.28446667, -80.35458611) and all high pressure launchers and receivers located at the Graham Header Station (located at 40.83600748440, -80.08065377390). MarkWest shall permanently remove all pig launchers and receivers that are subject to this Paragraph. Until MarkWest permanently ceases operations of the referenced launchers and receivers, MarkWest shall continue to use the existing Pig Ramps, Jumper Lines, and Flares to reduce VOC emissions during pigging operations.

Status Report Information:

The status of the closure of launchers and receivers located at the Drugmand, Stewart Route 50, and Graham Header facilities. If the facility is closed, provide the date the facility ceased operation, as required by Paragraph 17. *(CD Paragraph 58.c)*

Reporting Period Status:

The due date established by the Consent Decree is no later than twelve (12) months after the Effective Date (January 9, 2019) and is therefore outside the reporting period; however, MarkWest completed requirements prior to the Effective Date (July 9, 2018) and in accordance with the established deadline. The aforementioned information is provided Table IV-1 below:

Table IV-1

Facility	Status	Closure Date
Drugmand	Complete	Prior to 7/9/2018
Stewart Route 50	Complete	Prior to 7/9/2018
Graham Header	Complete	Prior to 7/9/2018

5. SEP COMPLETION REPORTS SUBMITTED

CD Requirement:

(CD Paragraph 30) Within thirty (30) Days after completion of a SEP, MarkWest shall submit a SEP Completion Report to the United States and PADEP in accordance with Section XVIII (Notices) of this Consent Decree. Each SEP Completion Report shall contain the following information:

a. A detailed description of the SEP as implemented;
b. A description of any problems encountered in completing the SEP and solutions thereto;
c. An itemized list of all eligible SEP costs expended;
d. Certification that the SEP has been fully implemented pursuant to the provisions of this Decree; and
e. To the extent feasible, a description of the environmental or public health benefits resulting from implementation of the SEPs.

The SEPs are the following:

a. Innovation Transfer and Emission Control Education
b. Humphreys Compressor Station Ambient Air Monitoring SEP
c. Harmon Creek Ambient Air Monitoring SEP

Status Report Information:

The date of any SEP Completion Reports submitted under Paragraph 30. Also, identify for which SEP the completion report was submitted. *(CD Paragraph 58.d)*

Reporting Period Status:

MarkWest did not submit any SEP Completion Reports during the reporting period for those projects required by Consent Decree paragraph 28. MarkWest is providing the following information on the Innovation Transfer and Emission Control Education SEP:

MarkWest has published the pig ramp design at
http://www.mplx.com/MarkWest_Energy/_Launcher_Receiver_Emission_Reduction_Systems/

MarkWest has completed the following trainings as shown in Table IV-1:

Table IV-1

Organization	Venue	Location	Date
West Virginia Oil and Gas Association	Fall Meeting	Morgantown, WV	10/2/2018
Ohio Oil and Gas Association	Fall Meeting	Cambridge, OH	11/8/2018
Marcellus Shale Coalition	November Meeting	Farmington, PA	11/28/2018

An update of progress made on the Humphreys Compressor Station SEP and Harmon Creek SEP is provided later in Section 13 of this status report.

6. NEW LAUNCHER OR RECEIVER CONSTRUCTION

CD Requirement:

(CD Paragraph 20) For pig launchers and receivers constructed in Pennsylvania and Ohio after the Effective Date and prior to Termination, MarkWest shall, subject to the exception in subparagraph e., below:

a. connect each high pressure pig launcher or receiver by Jumper Lines to a low pressure gathering line where such connection is Commercially Reasonable and Technically Feasible;
b. use Jumper Lines to depressurize such launchers and receivers prior to opening the launcher or receiver hatch;
c. at each new receiver, install and use a Pig Ramp or, with prior EPA written approval, technology that achieves equivalent emissions reductions;
d. at high pressure pig launchers and receivers, use shorter barrels than those presently used in the System, provided that the high pressure pig launcher or receiver is not in Liquid or Residue Gas Service and use of a shorter barrel is Commercially and Operationally Appropriate; and
e. in the event that MarkWest determines that any of the requirements in subparagraphs a., b., or d. above would pose a material adverse risk to worker safety, MarkWest may inform EPA of such risk and the reasons therefore, and upon written approval by EPA be excused from that requirement.

Status Report Information:

For any new launcher or receiver constructed after the Effective Date but prior to the Termination Date of this Decree, as provided in Paragraph 20, provide the date(s) and location of any: *(CD Paragraph 58.e)*

i. Jumper Lines installed; *(CD Paragraph 58.e.i)*
ii. Pig Ramps installed; *(CD Paragraph 58.e.ii)*
iii. An explanation for not installing Jumper Lines or Pig Ramps; *(CD Paragraph 58.e.iii)*
iv. Any instances where a Jumper Line was not used prior to opening the hatch; *(CD Paragraph 58.e.iv)*
v. An explanation for not using shorter barrels at high pressure launchers and receivers. *(CD Paragraph 58.e.v)*

Reporting Period Status:

Implementation of these requirements are detailed in Appendix A of this report.

7. EXISTING LAUNCHER OR RECEIVER AT COVERED FACILITY LOCATIONS

CD Requirement:

(CD Paragraph 12) Pennsylvania Compressor Stations. No later than the Effective Date, at the MarkWest Compressor Stations identified in Appendix 1, MarkWest shall:

a. connect each high pressure pig launcher and receiver by Jumper Lines to a low pressure gathering line;
b. install and use Pig Ramps in pig receivers.

(CD Paragraph 14) Pennsylvania Stand-Alone Facilities. No later than the Effective Date, MarkWest shall implement those elements of injunctive relief identified in this Paragraph that apply, as specified in Appendix 3, to each specific pig launcher and receiver located at each of the MarkWest Stand-Alone Facilities identified in Appendix 3. Where applicable, MarkWest shall:

a. connect high pressure pig launchers and receivers by Jumper Lines to a low pressure gathering line;
b. install and use Pig Ramps in pig receivers.

(CD Paragraph 18) Ohio Compressor Stations. No later than the Effective Date, MarkWest shall implement those elements of injunctive relief identified in this Paragraph that apply, as specified in Appendix 4, to each specific pig launcher and receiver located at each of the Mark West Compressor Stations identified in Appendix 4. Where applicable, MarkWest shall:

a. connect high pressure pig launchers and receivers by Jumper Lines to a low pressure gathering line;
b. install and use Pig Ramps in pig receivers

(CD Paragraph 19) Ohio Stand-Alone Facilities. No later than the Effective Date, MarkWest shall implement those elements of injunctive relief identified in this Paragraph that apply, as specified in Appendix 5, to each specific high pressure launcher and receiver located at each of the MarkWest Stand-Alone Facilities identified in Appendix 5. Where applicable, MarkWest shall:

a. connect high pressure pig launchers and receivers by Jumper Lines to a low pressure gathering line;
b. install and use Pig Ramps in pig receivers

(CD Paragraph 23) Liquid Containment Enhancement. For each launcher or receiver located at any MarkWest Compressor Station or Stand-Alone Facility identified in Appendices 1, 3, 4, 5, or 6, and each new launcher or receiver constructed after the Effective Date but prior to Termination in Pennsylvania and Ohio, MarkWest shall install and use liquid containers with grounded steel receptacles that are covered at all times when not in use.

Status Report Information:

For each launcher or receiver subject to the requirements of Paragraphs 12, 14, 18 and 19, provide, as applicable to each specific pig launcher or receiver, the date(s) and locations of: *(CD Paragraph 58.f)*

i. Jumper Lines installed; *(CD Paragraph 58.f.i)*
ii. Pig Ramps installed; and *(CD Paragraph 58.f.ii)*
iii. Liquid Containment vessels installed. *(CD Paragraph 58.f.iii)*

Reporting Period Status:

Implementation of these requirements are detailed in Appendix B of this report.

8. PERMIT APPLICATIONS SUBMITTED TO PADEP

CD Requirement:

(CD Paragraph 43) Pennsylvania Appendix 1 and Appendix 3 Facilities. For each Pennsylvania Compressor Station identified on Appendix 1 with the exception of Baker, Redd, and Tupta Day, and each Pennsylvania Stand-Alone Facility identified on Appendix 3 with the exception of Route 18, MarkWest will submit complete applications to PADEP, using PADEP application forms, seeking to incorporate as "applicable requirements" the injunctive relief listed in Paragraphs 12 through 16 of this Consent Decree into non-Title V state-only operating permits ("SOOPs") for those Covered Facilities that are federally enforceable and will survive termination of this Consent Decree. VOC emissions from pigging operations in the SOOP applications shall be determined in accordance with Paragraph 11. If, after the Effective Date, PADEP issues a revised version of its January 2015 General Plan Approval and/or General Operating Permit BAQ-GP A/GP-5 (Natural Gas Processing Stations, Processing Plants, and Transmission Stations) ("GP-5"), MarkWest will submit complete applications to PADEP, using PADEP application forms, seeking authorization to operate Baker, Redd, and Tupta Day Compressor Stations under the revised GP-5.

Status Report Information:

Copies of each permit application submitted to PADEP pursuant to Paragraph 43. *(CD Paragraph 58.g)*

Reporting Period Status

Based on conversations between MarkWest and PADEP, one draft SOOP application will be submitted for initial comment by PADEP. Upon approval from PADEP, MarkWest will submit no more than two SOOP applications per month. Based upon the aforementioned process, there have been two permit applications submitted to PADEP during the reporting period. Permit applications for Three Brothers CS was submitted on September 7, 2018 and Smith CS on November 6, 2018. These applications are provided in Appendix C.

9. PERMIT APPLICATIONS SUBMITTED TO OEPA

CD Requirement:

(CD Paragraph 45) Ohio Compressor Stations. For each Ohio Compressor Station identified on Appendix 4, MarkWest will submit complete applications to the Ohio Environmental Protection Agency ("OEPA") seeking to incorporate as "applicable requirements" the injunctive relief identified in Paragraph 18 (Ohio Compressor Stations) of the Consent Decree into non-Title V Permits to Install and Operate that are federally enforceable and will survive termination of this Consent Decree.

(CD Paragraph 46) Other Covered Ohio Stand-Alone Facilities. For each pig launcher and receiver identified in Appendix 5, MarkWest will submit complete applications to OEPA seeking coverage under Ohio General Permit GP 21.1 (Pigging at an Oil and Gas Compressor Station/Other Site).

Status Report Information:

Copies of each permit application or application seeking coverage under a general permit submitted to OEPA pursuant to Paragraphs 45 and 46. *(CD Paragraph 58.h)*

Date on which OEPA granted any permit or approval to operate under a general permit in response to applications submitted pursuant to Paragraphs 45 and 46. *(CD Paragraph 58.i)*

Reporting Period Status:

MarkWest was currently in the process during the reporting period of preparing draft Permits to Install and Operate (PTIO). There have been no applications submitted or permits granted during the reporting period.

10. EXISTING LAUNCHER OR RECEIVER JUMPER LINE INSTALLATION NOT AT COVERED FACILITY LOCATIONS

CD Requirement:

(CD Paragraph 22) At each high pressure pig launcher and receiver that Mark West currently operates in Pennsylvania and Ohio that is not located at a Covered Facility, MarkWest shall connect such high pressure pig launcher and receiver by pipe to a low pressure gathering line where such connection is Commercially Reasonable and Technically Feasible and operate such Jumper Lines to depressurize such launchers and receivers prior to opening the launcher or receiver hatch.

Status Report Information:

Date that any Jumper Line was installed pursuant to the requirements of Paragraph 22. *(CD Paragraph 58.j)*

Reporting Period Status:

While no date for completion was established in the Consent Decree, MarkWest completed some installations prior to the Effective Date (July 9, 2018). The aforementioned information is provided in Table X-1 below:

Table X-1

Facility	Equipment	Jumper Installation Date
Midway Candor	Midway Candor to Imperial CS HP Launcher	Prior to 7/9/2018
	Midway Candor to Joe Cain HP Launcher	Prior to 7/9/2018
	Smith CS to Midway Candor HP Receiver	Prior to 7/9/2018
	Cibus Ranch CS to Midway Candor HP Receiver	Prior to 7/9/2018
Imperial CS	Midway Candor to Imperial CS HP Receiver	Prior to 7/9/2018
Cibus CS	Cibus Ranch CS to Midway Candor HP Launcher	Prior to 7/9/2018
Larew CS	Larew to Spectra Interconnect 24in HP Residue Launcher	Prior to 7/9/2018
Sarsen Plant	Voll CS to Sarsen Plant 10" HP	Prior to 7/9/2018
	Sarsen to Bluestone 12" HP	Prior to 7/9/2018

11. EXISTING LAUNCHER OR RECEIVER PIG RAMP INSTALLATION AT STAND-ALONE FACILITY LOCATIONS

CD Requirement:

(CD Paragraph 21) Mark West shall install Pig Ramps in all pig receivers located at the Stand-Alone Facilities identified in Appendix 6.

Status Report Information:

Dates that Pig Ramps were installed for each receiver as required by Paragraph 21. *(CD Paragraph 58.k)*

Reporting Period Status:

While no date for completion was established in the Consent Decree, MarkWest completed all installations prior to the Effective Date (July 9, 2018). Information related to completed installations of pig ramps at Stand-Alone Facilities identified in Appendix 6 of the Consent Decree is provided in Appendix D of this status report. Please note the list in Appendix D has omitted several Stand-Alone Facilities due to those locations being launcher sites and therefore not requiring the installation of pig ramps.

12. MOBILE FLARE OPERATION

CD Requirement:

(CD Paragraph 18) Ohio Compressor Stations. No later than the Effective Date, MarkWest shall implement those elements of injunctive relief identified in this Paragraph that apply, as specified in Appendix 4, to each specific pig launcher and receiver located at each of the Mark West Compressor Stations identified in Appendix 4. Where applicable, MarkWest shall, *inter alia*, when necessary to ensure that VOC emissions do not exceed the Ohio VOC Permitting Threshold, use a Mobile Flare to control VOC emissions.

(CD Paragraph 19) Ohio Stand-Alone Facilities. No later than the Effective Date, MarkWest shall implement those elements of injunctive relief identified in this Paragraph that apply, as specified in Appendix 5, to each specific high pressure launcher and receiver located at each of the MarkWest Stand-Alone Facilities identified in Appendix 5. Where applicable, MarkWest shall, *inter alia*, when necessary to ensure compliance with the Ohio SIP, use a Mobile Flare to control VOC emissions.

Status Report Information:

Dates that a Mobile Flare was operated as required by Paragraphs 18 and 19. *(CD Paragraph 58.l)*

Reporting Period Status:

Based upon site operational conditions and emissions being generated, there were no instances where Mobile Flares were operated during the reporting period. As stated previously in this report, MarkWest has petitioned the USEAP to use a ZEVAC emission recovery system at the locations identified in Appendix 3 of the Consent Decree, as well as, other stand-alone launcher/receiver sites. MarkWest is currently awaiting a response from USEPA.

13. STATUS OF HCS AND HARMON CREEK MONITORING SEPS

CD Requirement:

(CD Paragraph 28.b) Humphreys Compressor Station Ambient Air Monitoring SEP. In accordance with Appendix 7, Mark West shall install and operate, for a period of at least seven hundred twenty (720) days, one (1) meteorological station and two (2) air sampling stations for sampling and analyzing speciated and total VOCs and reduced sulfur compounds ("RSCs"). One air sampling station will be located upwind and the other downwind of the Humphreys Compressor Station ("HCS") in Barnesville, Ohio. Within one hundred twenty (120) days of the Effective Date, MarkWest shall submit a plan ("Humphreys Monitoring Plan") to EPA for approval to conduct an ambient air monitoring SEP ("Humphreys SEP") near the HCS in accordance with the requirements of this subparagraph and Appendix 7. Following EPA approval of the Humphreys Monitoring Plan, Mark West shall install and operate the meteorological and air sampling stations in accordance with the approved Humphreys Monitoring Plan and Appendix 7. MarkWest shall submit quarterly information reports and annual reports to EPA as required by the approved Humphreys Monitoring Plan and Appendix 7.

(CD Paragraph 28.c) Harmon Creek Ambient Air Monitoring SEP. In accordance with Appendix 8, Mark West shall install and operate, for a period of at least seven hundred twenty (720) days, one (1) meteorological station and three (3) VOC air sampling stations located around the proposed Harmon Creek Gas Processing Plant ("Harmon Creek") in Smith Township, Washington County, Pennsylvania. Within one hundred twenty (120) days of the Effective Date, MarkWest shall submit a plan ("Harmon Creek Monitoring Plan") to EPA and PADEP, for approval by EPA in consultation with PADEP, to conduct an ambient air monitoring SEP near Harmon Creek in accordance with the requirements of this subparagraph and Appendix 8. Following EPA approval (in consultation with PADEP) of the Harmon Creek Monitoring Plan, Mark West shall install and operate the meteorological and air sampling stations in accordance with the approved Harmon Creek Monitoring Plan and Appendix 8. MarkWest shall submit quarterly information reports and annual reports to EPA and PADEP as required by the approved Harmon Creek Monitoring Plan and Appendix 8.

Status Report Information:

Status update for the HCS and Harmon Creek monitoring SEPs as set forth in Paragraph 28.b. and c. until those SEPs are completed. *(CD Paragraph 58.m)*

Reporting Period Status:

Humphreys Compressor Station Ambient Air Monitoring SEP

A summary of the Consent Decree requirements followed by any progress is provided below:

- Submit to USEPA a plan ("Humphreys Monitoring Plan") for approval to conduct ambient air monitoring at Humphreys Compressor Station ("HCS") within 120 days of the Effective Date, which is determined to be November 6, 2018
    - MarkWest submitted the Humphreys Monitoring Plan to USEPA on November 2, 2018.

- Following EPA approval of the Humphreys Monitoring Plan, MarkWest shall install and operate the meteorological and air sampling stations in accordance with the approved Humphreys Monitoring Plan and Consent Decree Appendix 7
    - MarkWest is currently awaiting USEPA approval of the Humphreys Monitoring Plan, therefore no installations have occurred during the reporting period.
- MarkWest shall submit quarterly information reports and annual reports to EPA as required by the approved Humphreys Monitoring Plan and Consent Decree Appendix 7
    - No reports were required to be submitted during the reporting period.

Harmon Creek Ambient Air Monitoring SEP

A summary of the Consent Decree requirements followed by any progress is provided below:

- Submit to USEPA a plan ("Harmon Creek Monitoring Plan") for approval to conduct ambient air monitoring near Harmon Creek within 120 days of the Effective Date, which is determined to be November 6, 2018
    - MarkWest submitted the Harmon Creek Monitoring Plan to USEPA on November 6, 2018 and is currently awaiting comments.
- Following EPA approval of the Harmon Creek Monitoring Plan, MarkWest shall install and operate the meteorological and air sampling stations in accordance with the approved Harmon Creek Monitoring Plan and Consent Decree Appendix 8
    - MarkWest is currently awaiting USEPA approval of the Harmon Creek Monitoring Plan, therefore no installations have occurred during the reporting period.
- MarkWest shall submit quarterly information reports and annual reports to EPA as required by the approved Harmon Creek Monitoring Plan and Consent Decree Appendix 8
    - No reports were required to be submitted during the reporting period.

14. CERTIFICATION

As required by Section XI, Paragraph 63, MarkWest provides the below certification and signature:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingly and willfully submitting a material false statement.

Date: 3/4/2014

Brian Rayburn

VP Operations Pipelines & Gathering

MarkWest Energy Partners, L.P.

APPENDIX A NEW LAUNCHER AND RECEIVER CONSTRUCTION

NRLP: Jumper was not required to be installed because the line was under low pressure
LAUNCHER: Pig Ramp was not installed because the equipment serves as a launcher.
*Coordinates being provided are reflective of the site location and not the individual equipment in this list.

Facility	Coordinates	Equipment	Jumper Installation Date	Pig Ramp Installation Date
129 Station	40.1910, -80.83115	Marquard to TR-129 Smith Station 20" LP Receiver	NRLP	9/14/2018
Bable Surface Site	40.44408, -80.35094	Bable to Smith CS 20" LP NG Launcher	NRLP	LAUNCHER
		Bigger SS to Bable SS 20" LP Receiver	NRLP	8/1/2018
		R Campbell Wells 12" LP Receiver	NRLP	8/15/2018
Bigger Surface Site	40.46867, -80.35691	Bigger Wells 20" LP NG Receiver	NRLP	10/3/2018
		Bigger SS to Bable SS 20" LP Launcher	NRLP	LAUNCHER
		Bigger Rd Station to Down Homes CS 20" LP A Launcher	NRLP	LAUNCHER
		Bigger Rd Station to Down Homes CS 20" LP B Launcher	NRLP	LAUNCHER
		Down Homes CS to Bigger SS 20" HP Receiver	8/2/2018	8/2/2018
		Bigger Surface Site to Smith CS 20" HP Launcher	8/2/2018	LAUNCHER
		Dalbo SS to Bigger Rd SS 20" LP Receiver	NRLP	11/16/2018
Bigger Well Pad	40.46593, -80.36004	Bigger Wells 20" LP NG Launcher	NRLP	LAUNCHER
Borum Well	40.29067, -80.85661	Borum SMF 12" HP Gas Lateral Launcher	NRLP	LAUNCHER
Brigich CS	40.28964, -80.23951	Chiarelli to Brigich CS 20" LP Receiver	NRLP	10/15/2018
Chiarelli Well	40.35453, -80.28077	Chiarelli to Bowen Road LP Launcher	NRLP	LAUNCHER
		Chiarelli to Brigich CS 20" LP Launcher	NRLP	LAUNCHER
		Chiarelli to Midway Candor 20" LP Launcher	NRLP	LAUNCHER
Dalbo Surface Site	40.48215, -80.35801	Dalbo Wells 12" LP Receiver	NRLP	11/16/2018
		Dalbo SS to Bigger Rd SS 20" LP Launcher	NRLP	LAUNCHER
Dalbo Well	40.48421, -80.34938	Dalbo Wells 12" LP Launcher	NRLP	LAUNCHER
Down Homes CS	40.47360, -80.35841	Bigger Rd Station to Down Homes CS 20" LP A Receiver	NRLP	8/2/2018

Facility	Coordinates	Equipment	Jumper Installation Date	Pig Ramp Installation Date
		Bigger Rd Station to Down Homes CS 20" LP B Receiver	NRLP	8/2/2018
		Down Homes CS to Bigger SS 20" HP Launcher	8/2/2018	LAUNCHER
Fernwood Bloomingdale Station	40.32630, -80.77568	Tanner WYN JF to Fernwood Bloomingdale Station 20" HP Receiver	NRLP	11/6/2018
Gary Launcher Station	39.81592, -80.99434	Gary 12" LP Gas Lateral Launcher	NRLP	LAUNCHER
Harmon Creek Plant	40.40401, -80.35880	Smith CS to Harmon Creek 20" HP Receiver	11/21/208	11/21/2018
		Harmon Creek to Rover 24" HP Sales Launcher	12/2/2018	LAUNCHER
		Harmon Creek to National Fuel 20" HP Sales Launcher	11/13/2018	LAUNCHER
Hoop C Well	40.16980, -81.32660	Hoop C 12" HP Gas Lateral Launcher	NRLP	LAUNCHER
Hornhead Rd Surface Site	40.31362, -80.25634	Lesnick Wells 12" LP Receiver	NRLP	10/15/2018
Imperial CS	40.38021, -80.28449	Imperial CS to Midway Candor 20" LP - via Pangersis Launcher	NRLP	LAUNCHER
Kelly Valve Station	40.26884, -80.85415	Borum SMF 12" HP Gas Lateral Receiver	NRLP	10/27/2018
Larew CS	39.82772, -80.99725	Gary 12" LP Gas Lateral Receiver	NRLP	8/1/2018
Lesnick Well	40.30269, -80.26228	Lesnick Wells 12" LP Launcher	NRLP	LAUNCHER
Marquard Station	40.19014, -80.79877	Marquard to TR-129 Smith Station 20" LP Launcher	NRLP	LAUNCHER
Midway Candor Surface Site Site	40.38199, -80.30279	Imperial CS to Midway Candor 20" LP - via Pangersis Receiver	NRLP	10/1/2018
Midway Candor Surface Site Site	40.38199, -80.30279	Chiarelli to Midway Candor 20" LP Receiver	NRLP	10/15/2018
Mohorovich Station	39.95478, -81.37771	Mohorovich 12" LP Launcher	NRLP	12/24/2018
Neff Station	39.99444, -81.38515	Mohorovich 12" LP Receiver	NRLP	12/24/2018
Nolan Receiver	40.32025, -80.75648	Nolan CRC JF 12" HP Lateral Receiver	NRLP	8/24/2018
Nolan Well	40.30865, -80.75550	Nolan CRC JF 12" HP Lateral Launcher	NRLP	LAUNCHER
R Campbell Well	40.44294, -80.33823	R Campbell Wells 12" LP Launcher	NRLP	LAUNCHER
Smith CS	40.41698, -80.35687	Bable to Smith CS 20" LP NG Receiver	NRLP	8/1/2018
		Bigger Surface Site to Smith CS 20" HP Receiver	8/2/2018	8/2/2018
		Smith CS to Harmon Creek 20" HP Launcher	11/21/2018	LAUNCHER

Facility	Coordinates	Equipment	Jumper Installation Date	Pig Ramp Installation Date
Tanner Station	40.34652, -80.81285	Tanner WYN JF to Fernwood Bloomingdale Station 20" HP Launcher	NRLP	LAUNCHER
Wagler Station	40.17352, -81.07825	Hoop C 12" HP Gas Lateral Receiver	NRLP	7/23/2018

APPENDIX B EXISTING LAUNCHER AND RECEIVER AT COVERED FACILITY LOCATIONS

NRLP: Equipment was not required to be installed because the line was under low pressure
NRCD: Equipment was not required per the Consent Decree Requirements
NR-Residue Gas: Equipment was not required to be installed because the line contained residue gas
*Coordinates being provided are reflective of the site location and not the individual equipment in this list.

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Three Brothers CS	40.33119, -80.38033	Joe Cain to Three Brothers CS 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Muskovich to Three Brothers CS 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Dryer CS to Three Brothers CS 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Three Brothers CS to Joe Cain 20" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
Baker CS	40.08051, -80.22257	Baker Sales 12" HP Residue Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Farabee Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Amwell TL to Baker CS 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Baker CS to Tupta Day CS 12" LP NG BL	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Brigich CS	40.28964, -80.23951	Brigich CS to Johnston CS 12" HP NG	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		AD Ferguson Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Brigich CS to Johnston CS 12" LP NG BL	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Engle Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Carpenter CS	40.11364, -80.48247	Carpenter to Wilhelm 16" HP NG TL	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Wilhelm to Carpenter 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Wilhelm to Carpenter 12" LP NG Recevier	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Dryer CS	40.24287, -80.46833	Temple to Dryer 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Dryer CS to Smith Tee 12" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Macadoo Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Goettal Wells 12" LP NG Lateral	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Dryer to 3 Brothers Launcher	NRLP	NRCD	Prior to 7/9/2019
Fulton CS	40.28485, -80.30122	Yonkers to Fulton 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Cowden to Fulton 12" HP NG Receiver	Prior to 7/9/2018	Out of Service	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Fulton CS	40.28485, -80.30122	Elm Road Station 12" LP NG Receiver	NRLP	Out of Service	Prior to 7/9/2019
		Fulton to Houston 12" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Godwin to Huntington Farms 6" HP NG	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Clingerman Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Huntington Farms to Godwin CS 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Godwin Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Mele to Godwin Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Hoskins CS	40.17991, -80.41232	Hoskins to Smith Tee 12" HP NG	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		C Zappi Wells 12" LP NG Lateral Receiver	NRLP	Out of Service	Prior to 7/9/2019
		Kerns Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Claysville Sportsman to Hoskins 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Hoskins to Post Road 16" HP NG	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
Johnston CS	40.27515, -80.23270	Brigich CS to Johnston CS 12" HP NG	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Johnston CS to Houston 12" HP NG	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Johnston Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Worstell Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Painter Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Brigich to Johnston 12" LP NG BL	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		W Paxton to Johnston CS 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Lowry CS	40.24932, -80.36840	Lowry MS to Lowry CS 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Lowry to Huntington Farms 12" HP NG	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Smith Tee to Lowry CS 12" HP NG Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Stewart to Lowry CS 12" HP NG Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		L Miller Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Triple to Lowry CS 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Temple to Lowry 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Lowry/Welling Balance Launcher	NRLP	NRCD	Prior to 7/9/2019
Redd CS	40.14328, -80.19907	Wagers Wells 12" LP NG Lateral Receiver	NRLP	NR - Residue Gas	Prior to 7/9/2019
		Bigley Wells 12" LP NG Lateral Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Redd CS	40.14328, -80.19907	Redd Sales 12" HP Residue Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
Royal Oak CS	40.76560, -80.03657	Baillie Trust to Royal Oak 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Royal Oak to Bluestone 16" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Double to Royal Oak 10" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		McElhinney to Royal Oak 10" HP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		McElhinney to Royal Oak 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Shaw CS	40.23917, -80.28146	Shaw CS to R Hoskins 12" LP NG	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		C Baker Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Shaw to Houston 12" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Huntington Farms to Shaw 12" HP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Smith CS	40.41698, -80.35687	Midway Candor to Smith 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Smith CS to Midway Candor 20" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Moore Park South Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Stewart CS	40.28269, -80.34980	Lehman Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Stewart to Rt 18 12" HP NG	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Stewart to Triple 12" LP NG	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Stewart to Lowry CS 12" HP NG Launcher	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
Trillith CS	40.85454, -80.10256	Burgh to Trillith CS 16" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Trillith to Bluestone 16" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Graham to Trillith 24" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Tupta Day CS	40.11326, -80.22364	Tupta Day Sales 12" HP Residue Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Baker CS to Tupta Day CS 12" LP NG BL	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		John Day Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Bedillion Day Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		McGowan to Tupta Day 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Voll CS	40.83941, -80.05602	Gilliland 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Voll to Sarsen 10" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Grosick 12" LP NG Launcher	NRLP	NRCD	Prior to 7/9/2019
Welling CS	40.19014, -80.35981	Mounts to Welling 20" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Welling CS	40.19014, -80.35981	Welling to Wilhelm 20" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Welling to Huntington Farms 20" HP NG	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Best to Welling CS 16" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Lowry CS to Welling CS 20" LP NG BL	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Buffalo Creek to Welling CS 20" LP Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
		Gillett Wells 12" LP NG Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Huntington Farms	40.24179, -80.31836	Godwin to Huntington Farms 6" HP NG Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Huntington Farms to Houston 20" HP Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Huntington Farms to Welling 20" HP Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Huntington Farms to Shaw 12" HP Launcher	NRLP	NRCD	Prior to 7/9/2019
		Lowry to Huntington Farms 12" HP Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Lowry Meter to Huntington Farms LP Receiver	NRLP	Prior to 7/9/2018	Prior to 7/9/2019
Loffert (Joe Cain)	40.35937, -80.31124	3 Bros to Loffert (Joe Cain) 20" HP Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Loffert (Joe Cain) to Drugmand 20" HP Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Midway to Joe Cain 20" HP Receiver *(formerly Smith to Loffert (Joe Cain) 20" HP Receiver)*	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Airport to Loffert (Joe Cain) 20" LP Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Malinky Wells 12" LP Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Post Road	40.16793, -80.39937	Hoskins to Post Road 16" HP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Route 18	40.33220, -80.36049	Stewart to Rt 18 12" HP Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Carns to Rt 18 12" LP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Inches to Rt 18 12" LP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Smith Tee	40.22352, -80.45690	Dryer to Smith Tee 12" HP Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Smith Tee to Hoskins 12" HP Launcher	NRCD	NRCD	Prior to 7/9/2019
		Smith Tee to Lowry CS 12" HP Launcher	NRCD	NRCD	Prior to 7/9/2019
Wilhelm	40.10854, -80.44762	Welling to Wilhelm 20" HP NG Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Wilhelm to Carpenter 16" HP TL	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Wilhelm to Majorsville 20" HP NG Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Claysville to Wilhelm 20" LP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Greathouse to Wilhelm 12" LP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Wilhelm	40.10854, -80.44762	Hamilton to Wilhelm 12" LP NG Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Arrowhead CS	40.17558, -81.07323	70T to Arrowhead HP Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Arrowhead to Cadiz Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Wagner to Arrowhead Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Darla to Arrowhead Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Miller Road to Arrowhead Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Barnesville West CS	40.00921, -81.18159	Barnesville West 12" Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Magee to Barnesville West Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		70T to Barnesville West Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Harrison West CS	40.20993, -81.21797	Harrison West to Cadiz Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Scott Hill to Harrison West Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Clay 20" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Humphreys CS	39.90690, -81.18857	Humphreys to Tri-County Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Wheatley to Humphreys Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Stronz Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Stuzman Reciever	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Lake CS	40.27823, -81.18158	Lake to Cadiz Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Central to Lake Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Kinsey Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Boy Scout Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Morristown CS	40.05873, -81.09610	Morristown 12" Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Morristown 20" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Tri-County CS	39.93935, -81.22777	Shannon to Tri-County Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Tri-County to Seneca Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019
		Tri-County to McCort 20" Launcher	NRCD	NRCD	Prior to 7/9/2019
		Humphreys to Tri-County Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Tri-County to Magee Launcher	NRCD	NRCD	Prior to 7/9/2019
70T	40.04734, -81.14391	Shannon to 70T Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		70T to Arrowhead Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
70T	40.04734, -81.14391	Morristown 12" Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
513 Station	40.00208, -81.30119	513 to Magee Launcher	NRCD	NRCD	Prior to 7/9/2019
		Neff Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Flesher Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
BK Stevens Station	40.19501, -81.17201	BK Stevens Launcher	NRCD	NRCD	Prior to 7/9/2019
		Michael 12" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Blaze Station	40.10962, -81.29647	Blaze Road Launcher	NRCD	NRCD	Prior to 7/9/2019
		Lawson Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Marshall Road Station	40.10960, -81.33329	Guernsey 20" Launcher	NRCD	NRCD	Prior to 7/9/2019
		Blaze Road Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Guernsey 12" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Smyrna McClelland Station	40.19920, -81.24539	Guernsey 20" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Clay 12" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Clay 20" Launcher	NRCD	NRCD	Prior to 7/9/2019
Boston McCort Receiver Station	39.92172, -81.20795	McCort to Wheatley Launcher	NRCD	NRCD	Prior to 7/9/2019
	39.92172, -81.20795	Tri-County to McCort 20" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		McCort 12" Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
McGee Station	39.94575, -81.23402	513 to McGee Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		McGee to Barnsville West Launcher	NRCD	NRCD	Prior to 7/9/2019
		Tri-County to McGee Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Brothers Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Neff Station	39.99432, -81.38529	Neff Launcher	NRCD	NRCD	Prior to 7/9/2019
		Shugert Daddy Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Onega Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Detweiler Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Oxford Siefert Station	40.02893, -81.30507	Flesher Launcher	NRCD	NRCD	Prior to 7/9/2019
		Karen Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
Shannon	40.01560, -81.19198	Shannon to Tri-County	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
		Shannon to 70T Launcher	Prior to 7/9/2018	NRCD	Prior to 7/9/2019

Facility	*Coordinates	Equipment	Jumper Line Installation Date	Pig Ramp Installation Date	Liquid Containment Installation Date
Shannon	40.01560, -81.19198	Barnesville West 12" Receiver	Prior to 7/9/2018	Prior to 7/9/2018	Prior to 7/9/2019
Scott Hill Station	40.21370, -81.19929	Scott Hill to Harrison West Launcher	NRCD	NRCD	Prior to 7/9/2019
		BK Stevens Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Scott Hill to Yoder Launcher	NRCD	NRCD	Prior to 7/9/2019
Wheatley Station	39.91013, -81.20167	McCort to Wheatley Receiver	NRCD	Prior to 7/9/2018	Prior to 7/9/2019
		Wheatley to Humphreys Launcher	NRCD	NRCD	Prior to 7/9/2019

APPENDIX C PERMIT APPLICATIONS SUBMITTED TO PADEP

Three Brothers CS

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1, Suite 1600
Denver, CO 80202-2126
(303) 925-9200

September 7, 2018

Mr. Tom Josephs

Environmental Engineer Manager (Permits)
PADEP SW Regional Office
400 Waterfront Dr.
Pittsburgh, PA 15222-4739

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station – SOOP Application

Dear Mr. Gorog:

MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) hereby submits a State Only Operating Permit (SOOP) for the Three Brothers Compressor Station located in Smith Township, Washington County, Pennsylvania. MarkWest is submitting the SOOP as required by a Consent Decree between the USEPA, the PADEP and MarkWest in 2018. The SOOP is required to have specific requirements and limitations for the operation of 'pig' launchers and receivers at the Three Brothers site.

This application includes all of the existing operational equipment in the most recent GP-5 application including the pig launchers and receivers. This application also seeks to make updates and corrections to existing equipment including: updating the fugitive component count and emission estimates, pigging emissions, updated GRI-GLYCalc, HYSYS and TANKS 4.0.9d simulations, maintenance activities, and emissions from compressor rod packing. With all these corrections the Three Brothers Compressor Station still remains a natural minor source.

Should you have any questions about this SOOP application, please contact me at (303) 542-0686 or via email at nwheldon@markwest.com.

Sincerely,

Nathan M. Wheldon, PE
Sr. Manager – Air Programs

MarkWest Liberty Midstream & Resources, LLC

Three Brothers Compressor Station

Smith Township, Washington County

Air Quality

State Only Operating Permit (SOOP) Application

Natural Gas Processing Plant

Current Approval No #: 63-00969A

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Section 1
Introduction

Introduction
MarkWest Liberty Midstream & Resource, LLC
Three Brothers Compressor Station

The Three Brothers Compressor Station is a compression and dehydration facility. Field natural gas from the surrounding areas enters the compressor station via one of three low pressure receivers. Once received, the incoming stream first passes through slug catchers and a phase separator to remove free liquids. Liquids are sent to the water/condensate tanks and the gas continues through a series of filters and scrubbers to remove particulates and oil droplets that may cause damage to downstream equipment. The gas continues through the compressor engines where the pressure of gas is raised to transport the gas downstream to a processing facility. After compression the gas is passed through the dehydration tower to remove residual water from the gas stream. The water recovered from the dehydration unit is also sent to the water/condensate tanks for storage. Once the gas has been dehydrated it is reinserted into a high pressure pipeline and sent to a gas processing plant for further processing. The liquids captured in the water/condensate tanks are removed by truck for disposal and/or further processing.

On August 28, 2012 MarkWest Liberty Midstream & Resources, LLC received a Plan Approval Permit (GP5-63-00969A) to construct and operate the Three Brothers Compressor Station located Smith Township, Washington County, PA. MarkWest has finalized construction and has been operating under this Plan Approval, with extensions, after having also submitted an application for authorization to use the GP-5 Permit on September 8, 2016, which has not yet been acted on by the Department. MarkWest is now submitting an application for a SOOP, as required in a Consent Decree between the USEPA, PADEP and MarkWest. Once issued, the SOOP will replace the Plan Approval and MarkWest will rescind the application for the GP-5 permit. This SOOP application seeks to authorize the operation of the following emission sources:

- Eight (8) Waukesha P9390GSI 1980 hp rich burn engines and associated emissions with 3-way catalysts
- Two (2) Waukesha L7042G 1480hp rich burn engines and associated emissions with 3-way catalysts
- One (1) 130MM scfd dehydration unit
- One (1) 2.0MM Btu/hr. re-boiler associated with the dehydration unit
- One (1) 7.0 mmbtu/hr flare to control emissions from dehydration unit off-gas
- One (1) 500bbl gun-barrel separation tank
- Four (4) 400bbl condensate and/or produced water tanks
    - Note: The storage tanks are controlled with a Vapor Recovery Unit (VRU) designed to control 100% of the flashing, breathing and evaporative losses. 98% control is being claimed to account for minor outages, etc...

Regulatory Review:

Federal New Source Performance Standards require new, modified, or reconstructed sources to control emissions to the level that is achievable by the best system of emission reduction as specified in the provisions of the applicable rule. The following section provides applicability determinations for each of the NSPS to which the Three Brothers Compressor Station is potential subject.

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

The storage tanks were built after July 23, 1984. However, the tanks have a design capacity less than 1,589.874 m3 (10,000 bbl) and are used to store condensate prior to custody transfer. Therefore, the tanks are exempt from the requirements of NSPS Subpart Kb [40 CFR 60.110b(d)(4)].

40 CFR Part 60, Subpart LLL – Standards of Performance for SO2 Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984 and on or August 23, 2011.

The compressor station is not an Onshore Natural Gas Processing unit, therefore, Subpart LLL does not apply.

40 CFR Part 60 Subpart IIII - Standards of Performance for Compression Ignition Internal Combustion Engines:

This subpart applies to diesel-fired engines. The Three Brothers Compressor Station does not have any diesel-powered engines as part of this application. At times diesel-fired power generation may be required to run the station during an upset in grid power to the facility. These engines meet the EPA criteria of non-road portable engines and as such are exempt from permitting, however, records will be kept to also show that the engines meet the exemption requirements specified in 25 Pa. Code 127.14(a)(8) Number 6.

40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines:

The natural gas-fired compressor engines are stationary spark ignition internal combustion engines manufactured after July 1, 2007 and are therefore subject to this subpart. As such MarkWest is subject to all the applicable requirements, including stack emission tests, in accordance with the subpart.

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

This subpart applies to sources at natural gas production facilities for which construction commenced after August 23, 2011. The following sections outline the applicability of the various components outlined under NSPS Subpart OOOO:

> **Reciprocating Compressors –** Each reciprocating compressor is subject to NSPS if it was constructed after August 23, 2011. Each compressor at the Three Brothers Compressor Station was constructed after August 23, 2011 and is therefore subject to this rule. For reciprocating compressors NSPS OOOO requires the replacement of rod packing every 26,000 hours or every 36 months of operation for each compressor. MarkWest meets this requirement by tracking the hours on each compressor and the maintenance intervals at which each rod packing replacement occurs.
>
> **Pneumatic Controllers –** Pneumatic controllers are subject to NSPS OOOO if they are continuous bleed natural gas-driven operating at a natural gas bleed rate greater than 6 scfh. The Three Brothers Compressor Station does not utilize any natural gas-driven pneumatic controllers with a continuous bleed rate greater than 6 scfh. Therefore, there are no pneumatic controllers subject to the requirements of NSPS OOOO.

Storage Vessels – NSPS OOOO applies to each storage vessel with the potential for VOC emissions equal to or greater than 6 tpy. As demonstrated in the emission calculations the storage tanks will not exceed VOC emissions limit of six (6) tpy with the use of the VRU. Therefore, these tanks are not considered affected facilities under NSPS OOOO.

Fugitive Components – NSPS OOOO incorporates by reference LDAR requirements to equipment that is located at an onshore natural gas processing plant. The Three Brothers Compressor Station does not meet the definition of an onshore natural gas processing plant. Therefore, the equipment leak standards in NSPS OOOO do not apply.

MarkWest does not have any gas wells, centrifugal compressors or sweetening units at the Three Brothers Compressor Station, therefore, these parts of NSPS OOOO do not apply.

40 CFR Part 60 Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Facilities:
NSPS Subpart OOOOa applies to facilities constructed, modified, or reconstructed after September 18, 2015. The Three Brothers Compressor Station completed construction prior to September 18, 2015 and is therefore not subject to NSPS OOOOa.

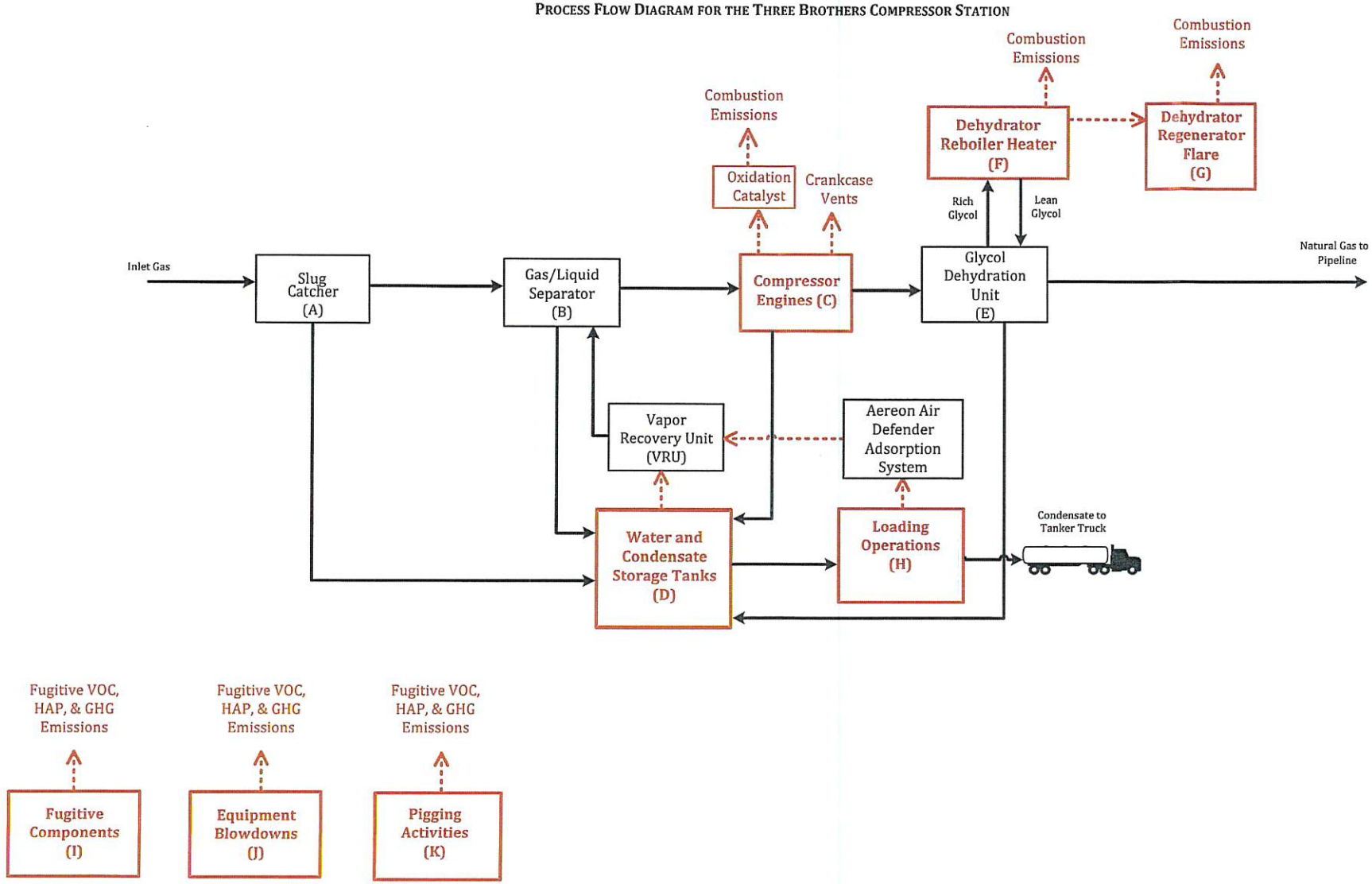
40 CFR Part 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities:
The dehydration unit at the facility is potentially subject to eh Subpart HH. However, potential benzene emissions from the unit are less than 0.90 megagrams per year. As such, the only applicable requirement is to keep records showing that the unit continues to comply with the exemption criterion.

40 CFR Part 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Source Categories from Stationary Reciprocating Internal Combustion Engines:
The facility is a minor (area) source of hazardous air pollutants (HAP). The proposed natural gas-fired engines are stationary reciprocating internal combustion engines (RICE) and commenced construction after the June 12, 2006 effective date for new stationary RICE at area sources and are therefore subject to this subpart. The engines meet requirements by compliance with Subpart JJJJ. No further requirements apply for these engines under this subpart.

The following is included with this application:

- Introduction
- General Information Form
- Municipal Notifications
- Compliance History Form
- SOOP Application
- Emission Estimates
- Payment of $750 to cover the application fee and first year operating fee

PROCESS FLOW DIAGRAM FOR THE THREE BROTHERS COMPRESSOR STATION



Process Flow Diagram Narrative

A Process Flow Diagram (PFD) has been attached to this permit application. The PFD does not attempt to show the exact engine model, numbers of tanks, etc..., however, it is still accurate for the process.

Gas enters the facility from the field via low-pressure pipelines. The low pressure pipelines merge into a common header and to the slug catchers (A) where any free liquids that condensed in the pipeline can be separated from the gas flow. The liquids are sent to the storage tank farm (D) and the gas continues through a series of inlet separators (B) to further enhance liquid removal. Next, the gas will flows through a compressor (C), where engines power a three-phase compression from field pressure (typically 70-130 psig) to enough pressure (about 1100 psig) to go through dehydration and travel to the designated processing plant. The gas-fired engines are controlled with oxidation catalyst to reduce CO, VOC, and HAP emissions. Also, fugitive emissions from the crankcase of the engines may be emitted directly to the atmosphere. Through the stages of compression liquids are collected as they drop out of the gas stream due to the increase in pressure, the liquids are again routed to the storage tanks (D). After compression, gas enters a common header and goes through another series of filters to remove entrained oil droplets that may be introduced through the compression process. The gas then enters the glycol contactor (E) to remove entrained water by rising through a tower with trays filled with descending lean tri-ethylene glycol (TEG), which has a strong affinity for water vapor but also adsorbs some hydrocarbon vapors. As it exits the bottom of the contactor the now rich TEG passes through a chamber heated by the reboiler (F) to a temperature above the vaporization temperature of water and below vaporization temperature of TEG to drive off the water and hydrocarbon vapors and thus recharge the TEG so it can be recirculated again through the top of the contactor. This water/hydrocarbon stream from the reboiler is then cooled to bring the water into the liquid state and then sent to the storage tanks (D). That part of the stream from the cooler which remains as gas goes to the flare to reduce VOC emissions. After undergoing dehydration the gas then passes through meters and out of the facility to a downstream processing plant, which is nominated by the production company. Both the incoming and outgoing pipelines are equipped with either a pig receiver or pig launcher (K), which is a short segment of pipe that can be separated by valves from the remainder of the pipeline. The segment of pipe is used to either load or unload a pig, which is a device used to clear the pipeline of residual liquids. Prior to opening the door to launch the pig in a high-pressure pipeline the launcher is isolated and then opened to a low-pressure pipeline until equilibrium is achieved to reduce pressure and thus VOCs in the segment. For both launcher and receivers the pressure in the segment must be eliminated prior to opening the door for safety reasons, thus valves are opened which allows the remaining gas to release to atmosphere. Only then can the door be opened to insert or retrieve a pig to maintain the pipeline.

Liquids that are removed during various phases at the facility are sent to the storage tank farm (D), into a gun-barrel tank which uses gravimetric separation to separate water from condensate by siphoning water off the bottom of the tank to the water tanks and condensate from the top to the condensate tanks. When the tanks begin to fill and reach a set point a trucking company is called to pump either water or condensate from the tanks and take off-site for either treatment, disposal or sale, depending on the quality of the product and the nomination from the production company. The facility utilizes vapor balancing and an adsorber system to collect vapors created in the loading operation (H), remove the oxygen for safety purposes and return the hydrocarbons to the storage tanks. This is achieved by

passing the gas through a carbon bed, which adsorbs the hydrocarbons but releases the oxygen and nitrogen to the atmosphere. After a truck has loaded the system will be closed and vacuum is pulled on the carbon bed to desorb the hydrocarbons and route them back to the storage tanks. A vapor recovery unit (VRU) is utilized to control emissions from flashing, working and breathing losses in the tanks. Pressure in the tanks is monitored so that the VRU will collect gas in the tanks when the pressure rises above the setpoint to keep the pressure below the relief valve settings. The collected gas is then compressed and returned to the low-pressure inlet header at the front of the facility. When the pressure in the tanks falls below the setpoint the VRU will cease to pull on tanks to avoid either sucking outside air and oxygen into the tank or causing the tank to cavitate.

Fugitive emissions may occur at several places throughout the station. Fugitive components (I) such as valves, connectors, flanges, compressors and pumps may leak directly into the atmosphere. These leaks are reduced by performing a quarterly Optical Gas Imaging (OGI) survey and fixing the leaking components. Equipment blowdowns (J) may also release gas to the atmosphere. Blowdowns occur when a piece of equipment such as an engine, compressor, or filter skid need to emptied to allow maintenance in a safe manner. Pigging activities (K), as described above may also have some fugitive emissions when the final pounds of pressure in a pig barrel are released to allow for the door of the pig trap to be opened safely.

Section 2
General Information Form (GIF)

8000-PM-IT0001 Rev. 10/2009
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related ID#s (If Known)		DEP USE ONLY
Client ID#	APS ID#	Date Received & General Notes
Site ID#	Auth ID#	
Facility ID#		

CLIENT INFORMATION

DEP Client ID#	**Client Type / Code** OWOP			
Organization Name or Registered Fictitious Name MarkWest Liberty Midstream and Resources, L.L.C.		**Employer ID#** (EIN) 30-0528059	**Dun & Bradstreet ID#**	
Individual Last Name	**First Name**	**MI**	**Suffix**	**SSN**
Additional Individual Last Name	**First Name**	**MI**	**Suffix**	**SSN**
Mailing Address Line 1 1515 Arapahoe St.		**Mailing Address Line 2** Tower 1, Suite 1600		
Address Last Line – City Denver	**State** CO	**ZIP+4** 80202-2137	**Country** USA	
Client Contact Last Name Wheldon	**First Name** Nathan	**MI** M	**Suffix**	
Client Contact Title Sr. Manager - Air Programs		**Phone** 303-542-0686	**Ext**	
Email Address nwheldon@markwest.com		**FAX** 303-573-4954		

SITE INFORMATION

DEP Site ID#	**Site Name** Three Brothers Compressor Station				
EPA ID#	**Estimated Number of Employees to be Present at Site**	< 25			
Description of Site Natural gas compression					
County Name Washington	**Municipality** Smith	**City** ☐	**Boro** ☐	**Twp** ☒	**State**
County Name	**Municipality**	**City** ☐	**Boro** ☐	**Twp** ☐	**State**
Site Location Line 1 858 Atlasburg Rd		**Site Location Line 2**			
Site Location Last Line – City Atlasburg	**State** PA	**ZIP+4** 15004			
Detailed Written Directions to Site From PA-18 and PA-50 intersection, go northwest (4.5 mi), turn left onto Atlasburg Rd/State Route 4031 (0.5 mi), turn left onto lease rd to the compressor station.					
Site Contact Last Name Uhl	**First Name** William	**MI**	**Suffix**		
Site Contact Title General Manager		**Site Contact Firm** MarkWest Liberty Midstream and Resources, L.L.C.			
Mailing Address Line 1 4600 J. Barry Court		**Mailing Address Line 2** Suite 500			
Mailing Address Last Line – City Canonsburg	**State** PA	**ZIP+4** 15317			

Phone	Ext	FAX	Email Address
724-514-4324			William.Uhl@markwest.com

NAICS Codes (Two- & Three-Digit Codes – List All That Apply): 211111

6-Digit Code (Optional): NA

Client to Site Relationship: OWNOP

FACILITY INFORMATION

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☒	☐
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☐	☒

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☒	Air Emission Plant		☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☐	Captive Hazardous Waste Operation		☐	MineDrainageTrmt/LandRecyProjLocation	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☐	Oil & Gas Encroachment Location	
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Anthracite		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Bituminous		☐	Residual Waste Operation	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Storage Tank Location	
☐	Encroachment Location (water, wetland)		☐	Water Pollution Control Facility	
☐	Erosion & Sediment Control Facility		☐	Water Resource	
☐	Explosive Storage Location		☐	Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Three Brothers CS	40	19	**54**	80	22	**43**

Horizontal Accuracy Measure: Feet --or-- Meters

Horizontal Reference Datum Code
- ☐ North American Datum of 1927
- ☐ North American Datum of 1983
- ☒ World Geodetic System of 1984

Horizontal Collection Method Code

Reference Point Code

Altitude: Feet 1,248 --or-- Meters NA

Altitude Datum Name
- ☐ The National Geodetic Vertical Datum of 1929
- ☐ The North American Vertical Datum of 1988 (NAVD88)

Altitude (Vertical) Location Datum Collection Method Code

Geometric Type Code

Data Collection Date

Source Map Scale Number: Inch(es) = Feet --or-- Centimeter(s) = Meters

PROJECT INFORMATION

Project Name
Three Brothers Compressor Station Modification

Project Description
Update Plan Approval to State Only Operating Permit (SOOP)

Project Consultant Last Name **First Name** **MI** **Suffix**

Project Consultant Title **Consulting Firm**

Mailing Address Line 1 **Mailing Address Line 2**

Address Last Line – City **State** **ZIP+4**

Phone	Ext	FAX	Email Address

Time Schedules	Project Milestone (Optional)

1. **Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?** ☒ Yes ☐ No

2. **Is your project funded by state or federal grants?** ☐ Yes ☒ No
   Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
   Aspect of Project Related to Grant
   Grant Source: _____
   Grant Contact Person: _____
   Grant Expiration Date: _____

3. **Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)** ☐ Yes ☒ No
   Note: If "No" to Question 3, the application is not subject to the Land Use Policy.
   If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1. **Is there an adopted county or multi-county comprehensive plan?** ☐ Yes ☐ No
2. **Is there an adopted municipal or multi-municipal comprehensive plan?** ☐ Yes ☐ No
3. **Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?** ☐ Yes ☐ No
   Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
   If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.
4. **Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation. ☐ Yes ☐ No
5. **Have you attached Municipal and County Land Use Letters for the project?** ☐ Yes ☐ No

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0. (DEP Use/48y1)	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?** (DEP Use/4x70)	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?** (DEP Use/4x70)	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?** (DEP Use/4x70)	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?** (DEP Use/4z41)	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0. (DEP Use/48y1)	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?** (DEP Use/4x70)	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?** (DEP Use/4x70)	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?** (DEP Use/4x70)	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No

3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0. (DEP Use/4z41)	☒	Yes	☐	No
3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?** (DEP Use/4z41)	☐	Yes	☒	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*. (DEP Use/4z41)	☐	Yes	☒	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4z41)	☐	Yes	☒	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. (DEP Use/4x66) **4.0.1 Total Disturbed Acreage**	☐	Yes	☒	No
5.0	**Does the project involve any of the following?** If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0. (DEP Use/4x10)	☐	Yes	☒	No
5.1	**Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?** (DEP Use /4x10).	☐	Yes	☐	No
5.2	**Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?** (DEP Use/4x10).	☐	Yes	☐	No
5.3	**Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain? (**DEP Use /4x10).	☐	Yes	☐	No
6.0	**Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?** (DEP Use/4x62)	☐	Yes	☒	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4x62)	☐	Yes	☒	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. (DEP Use/4x62) **8.0.1 Estimated Proposed Flow (gal/day)**	☐	Yes	☒	No
9.0	**Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?** (DEP Use/4x61).	☐	Yes	☒	No
	9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☒	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). (DEP Use/4X62) **10.0.1 Gallons Per Year (residential septage)** _____ **10.0.2 Dry Tons Per Year (biosolids)**	☐	Yes	☒	No

11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam. (DEP Use/3140) **11.0.1 Dam Name**	☐	Yes	☒	No
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam. (DEP Use/3140) **12.0.1 Dam Name**	☐	Yes	☒	No
13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission. (DEP Use/4x70) **13.0.1 Enter all types & amounts of emissions; separate each set with semicolons.** See Section 7 - Emission Estimates	☒	Yes	☐	No
14.0	**Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities. (DEP Use/4x81) **14.0.1 Number of Persons Served** _____ **14.0.2 Number of Employee/Guests** _____ **14.0.3 Number of Connections** _____	☐	Yes	☒	No
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☐	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
	14.0.6 Sub-Fac: Source	☐	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☐	Yes	☐	No
	14.0.8 Sub Fac: Transmission Main	☐	Yes	☐	No
	14.0.9 Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	**Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?** (DEP Use/4x81) and 4x52).	☐	Yes	☒	No
16.0	**Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. (DEP Use/4x81) **16.0.1 Supplier's Name** _____	☐	Yes	☒	No
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management. (DEP Use/4x81 and 4x10) **17.0.1 Stream Name**	☐	Yes	☒	No
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. (DEP/Use4x32) **18.0.1 Type & Amount**	☐	Yes	☒	No
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?** (DEP Use/48y1)	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **20.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **21.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No

22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **22.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
23.0	**Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **23.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
24.0	**Will the intended activity involve the use of a radiation source?** (DEP Use/4x90).	☐	Yes	☒	No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Leanne Meyer

Leanne Meyer	VP Corporate HES	9-7-18
Signature	**Title**	**Date**

Section 3
Municipal Notifications

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1,Suite 1600
Denver, CO 80202-2137
(800) 730-8388
(303) 925-9200
(303) 825-0902 Fax

August 31, 2018

Via Certified Mail: 7010 2780 0001 4763 2934
Washington County Commissioners
Courthouse Square
100 West Beau Street
Suite 702
Washington, PA 15301

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station – Application for State Only Operating Permit

Dear Commissioners:

This letter is being sent to notify the Township Officials that MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) has applied to the Pennsylvania Department of Environmental Protection (PADEP) for a State Only Operating Permit (SOOP) for the Three Brothers Compressor Station (Facility). The Facility currently operates under Plan Approval 63-00969A, which is due to expire on February 28, 2018. No modifications to equipment are proposed at this time. Equipment currently operating at the Facility includes eight (8) 1,980-hp Waukesha P9390GSI engines, two (2) 1,480-hp Waukesha L7042GSI engines, one (1) 130 mmscf/d glycol dehydration unit, one (1) 2.0 mmbtu/hr reboiler, one (1) 500-bbl gunbarrel tank, four (4) 400-bbl condensate and produced water storage tanks, and one flare.

The Facility is located at 858 Atlasburg Rd, Atlasburg, PA. 15004 in Smith Township, Washington County, PA.

This notice is being provided in accordance with the Municipal Notification requirements in General Plan Approval and/or General Operating Permit (BAQ-GPA/GP-5), Section A. General Conditions.

Anyone wishing to view this application may do so by making arrangements with:

Air Quality Program
PADEP - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA. 15222
(412) 442-4000

Thank you. Should you have any questions, please call me at (303) 542-0686 or e-mail at nwheldon@markwest.com.

Sincerely,

Nathan Wheldon, P.E.
Environmental Manager

Cc: Markwest file

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1,Suite 1600
Denver, CO 80202-2137
(800) 730-8388
(303) 925-9200
(303) 825-0902 Fax

August 31, 2018

Via Certified Mail: 7010 2780 0001 4763 2941

Smith Township
PO Box 94
Slovan, PA 15078

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station – Application for State Only Operating Permit

Dear Township Officials:

This letter is being sent to notify the Township Officials that MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) has applied to the Pennsylvania Department of Environmental Protection (PADEP) for a State Only Operating Permit (SOOP) for the Three Brothers Compressor Station (Facility). The Facility currently operates under Plan Approval 63-00969A, which is due to expire on February 28, 2018. No modifications to equipment are proposed at this time. Equipment currently operating at the Facility includes eight (8) 1,980-hp Waukesha P9390GSI engines, two (2) 1,480-hp Waukesha L7042GSI engines, one (1) 130 mmscf/d glycol dehydration unit, one (1) 2.0 mmbtu/hr reboiler, one (1) 500-bbl gunbarrel tank, four (4) 400-bbl condensate and produced water storage tanks, and one flare.

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This notice is being provided in accordance with the Municipal Notification requirements in General Plan Approval and/or General Operating Permit (BAQ-GPA/GP-5), Section A. General Conditions.

Anyone wishing to view this application may do so by making arrangements with:

Air Quality Program
PADEP - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA. 15222
(412) 442-4000

Thank you. Should you have any questions, please call me at (303) 542-0686 or e-mail at nwheldon@markwest.com.

Sincerely,

Nathan Wheldon, P.E.
Environmental Manager

Cc: Markwest file

Section 4
Compliance Review Form

2700-PM-AQ0004 Rev. 6/2006

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

Fully and accurately provide the following information, as specified. Attach additional sheets as necessary.

Type of Compliance Review Form Submittal (check all that apply)

☐ Original Filing
☒ Amended Filing

Date of Last Compliance Review Form Filing:
January 2018

Type of Submittal

☐ New Plan Approval
☒ Extension of Plan Approval
☐ Other: _____
☐ New Operating Permit
☐ Change of Ownership
☐ Renewal of Operating Permit
☐ Periodic Submission (@ 6 mos)

SECTION A. GENERAL APPLICATION INFORMATION

Name of Applicant/Permittee/("applicant")
(non-corporations-attach documentation of legal name)
MarkWest Liberty Midstream and Resources, L.L.C.

Address 1515 Arapahoe Street, Tower 1, Suite 1600
Denver, CO. 80202-2137

Telephone (303) 925-9200 **Taxpayer ID#** 30-0528059

Permit, Plan Approval or Application ID#

Identify the form of management under which the applicant conducts its business (check appropriate box)

☐ Individual
☐ Municipality
☐ Proprietorship
☒ Public Corporation
☐ Private Corporation
☐ Syndicate
☐ Municipal Authority
☐ Fictitious Name
☐ Partnership
☐ Limited Partnership
☐ Government Agency
☐ Joint Venture
☐ Association
☐ Other Type of Business, specify below:

Describe below the type(s) of business activities performed.
MarkWest Liberty Midstream and Resources, L.L.C. is a natural gas gathering and processing company.

SECTION B. GENERAL INFORMATION REGARDING "APPLICANT"

If applicant is a corporation or a division or other unit of a corporation, provide the names, principal places of business, state of incorporation, and taxpayer ID numbers of all domestic and foreign parent corporations (including the ultimate parent corporation), and all domestic and foreign subsidiary corporations of the ultimate parent corporation with operations in Pennsylvania. Please include all corporate divisions or units, (whether incorporated or unincorporated) and privately held corporations. (A diagram of corporate relationships may be provided to illustrate corporate relationships.) Attach additional sheets as necessary.

Unit Name	Principal Places of Business	State of Incorporation	Taxpayer ID	Relationship to Applicant
No changes				

SECTION C. SPECIFIC INFORMATION REGARDING APPLICANT AND ITS "RELATED PARTIES"

Pennsylvania Facilities. List the name and location (mailing address, municipality, county), telephone number, and relationship to applicant (parent, subsidiary or general partner) of applicant and all Related Parties' places of business, and facilities in Pennsylvania. Attach additional sheets as necessary.

Unit Name	Street Address	County and Municipality	Telephone No.	Relationship to Applicant
No changes				

Provide the names and business addresses of all general partners of the applicant and parent and subsidiary corporations, if any.

Name	Business Address
MPLX, LP	200 E. Hardin Street, Findlay, OH 45840
MarkWest Energy Partners, L.P.	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016
MarkWest Liberty M&R, L.L.C.	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016
MarkWest Liberty Bluestone, L.L.C.	440 Hartmann Road, Evans City, PA. 16033

List the names and business address of persons with overall management responsibility for the process being permitted (i.e. plant manager).

Name	Business Address
Bill Uhl, General Manager	4600 J. Barry Ct., Canonsburg, PA. 15317
Brian Rayburn, VP –Pipeline and Compression	4600 J. Barry Ct., Canonsburg, PA. 15317
Greg Bezdek, Sr. VP NEBU	4600 J. Barry Ct., Canonsburg, PA. 15317
Greg Floerke, Executive VP and COO	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016

Plan Approvals or Operating Permits. List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time 5 years prior to the date on which this form is notarized. This list shall include the plan approval and operating permit numbers, locations, issuance and expiration dates. Attach additional sheets as necessary.

Air Contamination Source	Plan Approval/ Operating Permit#	Location	Issuance Date	Expiration Date
Houston Gas Plant	PA-63-00936F	800 Western Ave	10/4/2012	11/2018
Baker CS	GP5-63-00960B	151 Baker Station Road	12/12/2011	12/12/2016 (Renewal Submitted 11/8/2016)
Brigich CS	GP5-63-00954C	340 Brigich Road	10/7/2010	10/7/2015 (Renewal Submitted 9/2/2015)
Carpenter CS	GP5-63-00987	265 Old National Pike	3/31/2014	3/31/2019
Down Homes CS	GP5-63-1009A	2037 Sunnyhill Road	5/16/2017	5/16/2022
Dryer CS	GP5-63-00942C	819 Scenic Drive	5/16/2016	5/16/2021
Fulton CS	GP5-63-00937D	103 Washington Ave	3/1/2012	3/1/2017 (Modification submitted 2/17/2017)
Godwin CS	GP5-63-00934C	2158 Henderson Ave	8/11/2016	8/11/2016 (Renewal submitted 7/8/2016)
Harmon Creek Gas Plant	GP1-63-01011A GP5-63-01011A	Smith Township	1/17/2018	1/17/2023
Hoskins CS	GP5-63-00938B	4026 Buffalo Creek Road	6/21/2011	6/21/2016 (Renewal submitted 5/19/2016)
Imperial-Cibus Ranch CS	GP5-63-00992	2213 Quiksilver Rd. 2199 Quiksilver Rd.	12/30/2015	12/30/2020
Johnston CS	GP5-63-00933D	210 Johnston Hill Road	7/22/2011	7/22/2016 (Renewal Submitted 6/20/2016)
Lowry CS	GP5-63-00947B	100 Oakleaf Rd	12/2/2011	12/2/2016 (Modification submitted 1/12/2016)
Redd CS	GP5-63-00962	576 Redd Run Rd.	5/18/2011	5/18/2016 (Renewal Submitted 4/14/2016)
Shaw CS	GP5-63-00940C	492 Arden Mine Rd	8/18/2011	8/18/2016 (Renewal Submitted 1/25/2016)

Smith CS	GP5-63-00968 PA-63-00968A	320 Point Pleasant Rd	7/11/2013 (PA)	10/28/2016 (PA) GP-5 Submitted 1/21/2016
Stewart CS	GP5-63-00939C	185 Avella Road	5/16/2016	5/16/2021
Three Brothers CS	GP5-63-00969 & Plan Approval 63-00969A	858 Atlasburg Road	12/30/2011 (GP5) 8/27/2012 (PA)	12/30/2016 (GP5) 11/2/2015 (PA) (Extension submitted 10/15/2015)
Tupta Day CS	GP5-63-00948C	200 Johnson Rd	1/31/2012	1/31/2017 (Renewal Submitted 1/12/2017)
Welling CS	GP5-00958A	165 Carlisle Rd	1/30/2015	1/30/2020
Sarsen Gas Plant	SOOP 10-00359	774 Prospect Rd.	12/03/2013	11/30/2018
Voll CS	GP5-10-367C	Off of Woodlands Rd, between Club House Dr and Prospect Rd	5/13/2014	4/30/2019
Trilith CS	GP5-10-370D	Southeast of intersection of Highway 79 an E Lancaster Rd	1/24/2014	12/31/2018
Royal Oak CS	GP5-10-390A	961 Brownsdale Rd	2/4/2014	1/31/2019
Bluestone Gas Plant	SOOP-10-368 PA-10-368F	440 Hartmann Rd.	11/6/2013 1/22/2018	10/31/2018 1/22/2023

Compliance Background. (Note: Copies of specific documents, if applicable, must be made available to the Department upon its request.) List all documented conduct of violations or enforcement actions identified by the Department pursuant to the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. Attach additional sheets as necessary. See the definition of "documented conduct" for further clarification. Unless specifically directed by the Department, deviations which have been previously reported to the Department in writing, relating to monitoring and reporting, need not be reported.

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status: Litigation Existing/Continuing or Corrected/Date	Dollar Amount Penalty
No change						$
						$
						$
						$
						$
						$

List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Litigation Existing/Continuing Or Corrected/Date
July 6, 2015	Various	--	Pig Launcher/Receiver Permitting	Ongoing consent order negotiations with USEPA.
2016	Houston Plant and Other Gas Plants	PA-63-00936F	LDAR	Ongoing consent order negotiations with USEPA.

<u>CONTINUING OBLIGATION</u>. Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional deviations occur between the date of submission and Department action on the application.

VERIFICATION STATEMENT	
Subject to the penalties of Title 18 Pa.C.S. Section 4904 and 35 P.S. Section 4009(b)(2), I verify under penalty of law that I am authorized to make this verification on behalf of the Applicant/Permittee. I further verify that the information contained in this Compliance Review Form is true and complete to the best of my belief formed after reasonable inquiry. I further verify that reasonable procedures are in place to ensure that "documented conduct" and "deviations" as defined in 25 Pa Code Section 121.1 are identified and included in the information set forth in this Compliance Review Form.	
Leanne Meyer Signature	9-7-18 Date
Leanne Meyer Name (Print or Type)	
VP Corporate of HES Title	

Section 5
SOOP Application

2700-PM-AQ0013 Rev. 8/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

STATE-ONLY PERMIT APPLICATION

FOR OFFICIAL USE ONLY
State-Only OP Number: _____
Reviewed by: _____
Date: _____
Comments: _____

Section 1 - General Information

1.1 Application Type

Type of permit for which application is made: (Check one)

☒ Initial

☐ Renewal Operating Permit No. _____

☐ Application Revision

1.2 Plant Information

Federal Tax ID: 30-0528059 Firm Name: MarkWest Liberty Midstream & Resources, LLC

Plant Code: _____ Plant Name: Three Brothers Compressor Station

NAICS Code: 211111 SIC Code: 1311

Description of NAICS Code: Natural Gas Liquid Extraction

Description of SIC Code: Natural Gas Liquids

County: Washington Municipality Independence Township

Latitude: 40° 19' 54" Longitude: 80° 22' 43"

Horizontal Reference Datum: NAD 83 Horizontal Collection Method: _____ Reference Point: TOPO

1.3 Contact Information

Name: Nathan Wheldon Title: Sr. Manager – Air Projects

Address: 1515 Arapahoe Street Tower 1 Suite 1600
Denver, CO 80202-2137

Telephone Number: (303) 543-0686

Email Address: nwheldon@markwest.com

1.4 Certification of Truth, Accuracy and Completeness

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete.

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete.

(Signed) Leanne M Meyer Date: 9-7-18

Name (Typed): Leanne Meyer Title: VP Corporate HES

Please read instructions carefully before completing this application.

Section 2 - Site Information

2.1 Potential Emission Estimates for the Site

Provide the estimated potential emission for the site BEFORE and AFTER utilizing the proposed restriction(s) and/or limitation(s).

Pollutant or CAS No.	Potential Emission BEFORE taking Limitations (TPY)	Potential Emission AFTER taking Limitations (TPY)
NOx	38.61	38.61
CO	50.55	50.55
VOC	43.28	43.28
PM	6.65	6.65
HAPs	10.13	10.13
CO_2	87,153.33	87,153.33
Benzene	1.09	1.09
Toluene	0.50	0.50
Ethylbenzene	0.02	0.02
Xylenes	0.19	0.19
N-hexane	0.51	0.51
Formaldehyde	1.82	1.82

*** Provide all supporting calculation methods as an attachment at the end of this application.**

2.2 Facility Type

Is this facility a Synthetic Minor Facility? Yes ☐ No ☒

If yes, go to Section 2.3, "Synthetic Minor Facility".

If no, go to Section 3, "Site Inventory".

IMPORTANT: Note that all Synthetic Minor Facilities must be able to meet the proposed restriction(s) and/or limitation(s) immediately upon the submission of this application. By signing the Certification of Compliance in Section 13 of this application, the facility for which a Synthetic Minor Status is proposed will be deemed a Synthetic Minor Facility according to the restriction(s) and/or limitation(s) proposed upon receipt of the application by the Department, unless the Department determines that the facility is unable to meet the Synthetic Minor requirements at a later date.

Please read instructions carefully before completing this application.

2.3 Synthetic Minor Facility Information (to be completed by all facilities seeking Synthetic Minor Status)

Synthetic Minor Status for this facility can be taken at the: Source Level ☐ AND/OR Site Level ☐

If limitation(s) and/or restriction(s) can be taken at the site level (for all sources within this facility), complete the following questions, otherwise please go on to Section 3, "Site Inventory".

Synthetic Minor Status for the Entire Site is achievable through the following restrictions: (Please check all that apply and describe in detail what is/are proposed):

☐	Hours of Operation	
☐	Production/Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitiations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor: **The facility is a natural minor source**

Note: If Section 2.3 is completed and there are no additional restrictions proposed at the source level, the applicant can omit Subsections 5, 6, and 7 in Sections 5, 6, and 7 for all sources in this permit application.

2.4 Compliance Method for the Site (for Synthetic Minor Facilities only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 2.3.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s) listed in Section 2.3:

b. Describe what is to be reported in the compliance report:

c. Reporting start date:

d. Indicate the frequency for submitting compliance report as explained above:

Please read instructions carefully before completing this application.

Section 3 - Site Inventory

List all air pollution sources, control equipment, emission points and fuel material locations at this site. Duplicate this page as necessary. For renewals, only list sources not included in current permit.

Unit ID No.	Company Designation	Unit Type
	Plant Sources	
101	*Waukesha L7042GSI*	*combustion*
102	*Waukesha L7042GSI*	*combustion*
103	*Waukesha P9390GSI*	*combustion*
104	*Waukesha P9390GSI*	*combustion*
105	*Waukesha P9390GSI*	*combustion*
106	*Waukesha P9390GSI*	*combustion*
107	*Waukesha P9390GSI*	*combustion*
108	*Waukesha P9390GSI*	*combustion*
109	*Waukesha P9390GSI*	*combustion*
110	*Waukesha P9390GSI*	*combustion*
201	*Dehydration Unit*	*process*
202	*Dehydration Unit Reboiler*	*combustion*
301	*Storage Tanks*	*process*
302	*Truck Loadout*	*process*
401	*Fugitive Component Emissions*	*process*
402	*Blowdown Emissions*	*process*
403	*Pigging Emissions*	*process*
404	*Crankcase Vents*	*process*
	Control Devices	
C2O1	*Dehydration Flare*	*control*
C301	*VRU*	*control*
C302	*Aereon Air Defender (Adsorber)*	*control*
	Combustion Source Stacks	
S101	*Waukesha L7042GSI Stack*	*exhaust*
S102	*Waukesha L7042GSI Stack*	*exhaust*
S103	*Waukesha P9390GSI Stack*	*exhaust*
S104	*Waukesha P9390GSI Stack*	*exhaust*
S105	*Waukesha P9390GSI Stack*	*exhaust*
S106	*Waukesha P9390GSI Stack*	*exhaust*
S107	*Waukesha P9390GSI Stack*	*exhaust*

Please read instructions carefully before completing this application.

S108	*Waukesha P9390GSI Stack*	*exhaust*
S109	*Waukesha P9390GSI Stack*	*exhaust*
S110	*Waukesha P9390GSI Stack*	*exhaust*
S202	*Dehydration Reboiler Vent Stack*	*exhaust*
	Flare Stacks	
SC1O1	*Dehydration Flare*	*exhaust*
SC302	*Aereon Air Defender (Adsorber)*	*exhaust*

Please read instructions carefully before completing this application.

Section 4 - Source Group (Optional)

4.1 Source Group Definition

This section applies to new State-Only Operating Permit applications only.

Define groups of source(s) that are subject to one or more applicable requirements that apply to all source(s) in the group.

Group No.	Source ID (for source(s) in this group)
Group #1 Gas-Fired Rich-Burn Engines	101, 102, 103, 104, 105, 106, 107, 108, 109, 110

4.2 Applicable Requirements for Source Groups

For renewals, only list group level requirements not included in the current State-Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State-Only Operating Permit.

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group Number	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 101, 102 b. Company Designation: Unit #1, #2

c. Plan Approval or Operating Permit Number: GP5-63-00969

d. Manufacturer: Waukesha e. Model Number: L7042GSI

f. Source Description: Rich-Burn Natural Gas-Fired Engine

g. Rated Heat Input/Thruput: 1,480 HP h. Installation Date: 10/12/2012

i. Exhaust Temperature: 1126 Units: F j. Exhaust % Moisture: 5 k. Exhaust Flow Volume: ~2250 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
101, 102	Combustion Unit	S101, S102	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		11.39 mmbtu/hr	

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		negligible	negligible	1300 btu/scf (HHV)

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 103, 104, 105, 106, 107, 108, 109, 110

b. Company Designation: Unit #3, #4, #5, #6, #7, #8, #9, #10

c. Plan Approval or Operating Permit Number: PA-63-00969A

d. Manufacturer: Waukesha

e. Model Number: P9390GSI

f. Source Description: Rich-Burn Natural Gas-Fired Engine

g. Rated Heat Input/Thruput: 1,980 HP

h. Installation Dates: 11/3/2012, 9/9/2014, 11/5/2012, 1/18/2013, 12/21/2012, 12/30/2013, 12/31/2013, 1/14/2014, 1/14/2014

i. Exhaust Temperature: 1177 Units: F

j. Exhaust % Moisture: 5

k. Exhaust Flow Volume: ~3047 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
103-110	Combustion Unit	103-110	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		15.43 mmbtu/hr	

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		negligible	negligible	1300 btu/scf (HHV)

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

Please read instructions carefully before completing this application.

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 202 b. Company Designation: Dehydration Reboiler

c. Plan Approval or Operating Permit Number: GP5-63-00969

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Dehydration Reboiler

g. Rated Heat Input/Thruput: 2.0 mmbtu/hr. h. Installation Date: 10/12/2012

i. Exhaust Temperature: ~400 Units: F j. Exhaust % Moisture: 5 k. Exhaust Flow Volume: ~200 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
202	Dehydration Reboiler	S202	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		2.0 mmbtu/hr	

Please read instructions carefully before completing this application.

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		Neg.	Neg.	1300 Btu/cf

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 6 - Incinerator Operational Inventory

(Complete this section for each incinerator at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

6.1 General Source Information

a. Unit ID: none b. Company Designation: _____

c. Plan Approval or Operating Permit Number: _____

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: _____

g. Rated Heat Input/Thruput: _____ h. Installation Date: _____

i. Exhaust Temperature: _____ Units: _____ j. Exhaust % Moisture: _____ k. Exhaust Flow Volume: _____ SCFM

l. Inc. Capacity: _____ Lbs/Hr m. Primary Burner Heat Input: Units:

n. Exhaust % CO_2: _____ o. Secondary Burner Heat Input: _____ Units: _____

p. Incinerator Class: _____

q. Waste Type: _____ r. Waste BTU/lb: _____

6.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow

6.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

6.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

6.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

6.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 6.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

6.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 6.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

6.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 201 b. Company Designation: Dehydration Unit

c. Plan Approval or Operating Permit Number: PA-63-00969A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Dehydration Unit

g. Rated Heat Input/Thruput: 130 mmscf/d h. Installation Date: 10/12/2012

i. Exhaust Temperature: amb. Units: F j. Exhaust % Moisture: k. Exhaust Flow Volume: na SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
201	Dehydration Unit	C201	Dehydration Flare	100
C101	Dehydration Flare	SC201	Dehydration Flare Stack	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 301 b. Company Designation: Storage Tanks

c. Plan Approval or Operating Permit Number: GP5-63-00969

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Storage Tanks

g. Rated Heat Input/Thruput: 400 bbl h. Installation Date: 10/12/2012

i. Exhaust Temperature: Units: F j. Exhaust % Moisture: k. Exhaust Flow Volume: na

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
301	Storage Tanks	VRU	C301	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 302 b. Company Designation: Truck Load Out Operation

c. Plan Approval or Operating Permit Number: GP5-63-00936

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Truck Load Out

g. Rated Heat Input/Thruput: 370,833 gal/yr h. Installation Date: 10/12/2012

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
302	Truck Loadout	C302	Aereon Air Defender	100*
C302	Aereon Air Defender	301	Storage Tanks	100

*Air Defender passes oxygen and nitrogen to atmosphere, hydrocarbons returned to tanks.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 401 b. Company Designation: Fugitive Emissions

c. Plan Approval or Operating Permit Number: PA-63-00969

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Fugitives

g. Rated Heat Input/Thruput: _____ h. Installation Date: 10/12/2012-1/31/2014

i. Exhaust Temperature: Amb. Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
401	Fugitves	ATM	Atmosphere	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 402 b. Company Designation: Facility Blowdowns

c. Plan Approval or Operating Permit Number:

d. Manufacturer: e. Model Number:

f. Source Description: Blowdowns

g. Rated Heat Input/Thruput: h. Installation Date: 10/12/2012-1/31/2014

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
402	Blowdowns	ATM	Atmosphere	100*

*Blowdowns of engines are first routed to inlet to reduce the pressure, any remaining pressure requiring blowdown goes to the atmosphere.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 403 b. Company Designation: Pigging Emissions

c. Plan Approval or Operating Permit Number:

d. Manufacturer: e. Model Number:

f. Source Description: Pigging Emissions

g. Rated Heat Input/Thruput: h. Installation Date:

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
403	Pigging Emissions	ATM	Atmosphere	100*

* Pigging Emissions are first blown to a lower pressure line to reduce pressure and then released to atmosphere.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)
Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 404 b. Company Designation: Crankcase Vents

c. Plan Approval or Operating Permit Number:

d. Manufacturer: Waukesha e. Model Number: L7042GSI-P9390GSI

f. Source Description: Crankcase Vents

g. Rated Heat Input/Thruput: h. Installation Date: 10/12/2012-1/31/2014

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
101-110	Crankcase Vents	Atm	Atmosphere	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C201 b. Company Designation: Dehydration Flare

c. Used by Sources: 201

d. Type: Flare Industries

e. Pressure Drop in H_2O: _____ f. Capture Efficiency: 100

g. Scrubber Flow Rate (GPM): _____

h. Manufacturer: Jordan i. Model Number: _____

j. Installation Date: 10/12/2012

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
VOCs		98+	testing

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C301 b. Company Designation: VRU

c. Used by Sources: 301, 302

d. Type:

e. Pressure Drop in H_2O: f. Capture Efficiency: 100

g. Scrubber Flow Rate (GPM):

h. Manufacturer: i. Model Number:

j. Installation Date: 10/12/2012

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
VOCs		98+	Mfg.

Please read instructions carefully before completing this application.

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C302 b. Company Designation: Aereon Air Defender (Adsorber)

c. Used by Sources: 302

d. Type:

e. Pressure Drop in H_2O: f. Capture Efficiency: 100

g. Scrubber Flow Rate (GPM):

h. Manufacturer: Jordan i. Model Number: Aereon Air Defender

j. Installation Date: 2017

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
VOCs		98+	Mfg./Source Testing

Please read instructions carefully before completing this application.

Section 9 – Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S101, S102 b. Company Designation: Waukesha L7042GSI Stack

c. Discharge Type: Vertical Stack

d. Diameter (ft): 1.0 Height (ft): ~30 Base Elevation (ft): Approx. 1200

e. Exhaust Temperature: 820 Exhaust % Moisture: 5 Exhaust Velocity: 47.8 fps

f. Exhaust Volume: 2250 ACFM Exhaust Volume: 914 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 101, 102

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

a. Unit ID: S103-S110 b. Company Designation: Waukesha P9390GSI Stack

c. Discharge Type: Vertical Stack

d. Diameter (ft): 1.58 Height (ft): ~30 Base Elevation (ft): Approx. 1200

e. Exhaust Temperature: 840 Exhaust % Moisture: 5 Exhaust Velocity: 25.9 fps

f. Exhaust Volume: 3047 ACFM Exhaust Volume: 1,219 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 034

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

Please read instructions carefully before completing this application.

Section 9 – Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Company Designation: Dehydration Reboiler Stack

c. Discharge Type: vertical

d. Diameter (ft): ~0.5 Height (ft): ~15 Base Elevation (ft): Approx.. 1200

e. Exhaust Temperature: ~500 Exhaust % Moisture: 5 Exhaust Velocity: >15.8 fps

f. Exhaust Volume: 746 ACFM Exhaust Volume: 403 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 202

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

a. Unit ID: SC201 b. Company Designation: Dehydration Flare Stack

c. Discharge Type: vertical

d. Diameter (ft): 6.0 Height (ft): 15 Base Elevation (ft): Approx.. 1200

e. Exhaust Temperature: ~800 Exhaust % Moisture: 5 Exhaust Velocity: ~0.60 fps

f. Exhaust Volume: ~1,013 ACFM Exhaust Volume: ~370 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 036

j. Latitude: 40 15 47 Longitude: 80 15 14
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

Section 10 – Fuel Material Location (FML) Information (Optional)

For renewals, review and correct any pre-printed information and add additional sections for any new FML listed in Section 3 of this application.

10.1 Fuel Material Location Information

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: % Sulfur: BTU Content: Units:

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

Please read instructions carefully before completing this application.

Section 11 – Alternative Operating Scenario (optional)

(Duplicate this section for each source participated in this alternative scenarios)

11.1 General Information

a. Alternative Operating Scenario Name or ID No.: No alternate operating scenarios

b. Source ID No.: _____ c. Source Name: _____

d. Source Type (check one): ☐ Combustion ☐ Incinerator ☐ Process

e. Give a brief description of this alternative scenario stating how it is different from the standard operation:

11.2 Operational Flexibility Request

Check all that apply.

☐ Alternative exhaust system component configuration.
If this box is checked, complete Sections 11.3 and 11.7

☐ Alternative type of fuel replacing or in addition to an existing fuel in standard operation.
If this box is checked, complete Sections 11.4 and/or 11.5 and 11.7

☐ Alternative process method replacing or in addition to a process SCC existing in standard operation.
If this box is checked, complete Sections 11.6 and 11.7

☐ Alternative lower limitations.

11.3 Exhaust System Components

Specify the complete exhaust system component configuration for this alternative operating scenario.

From Component Type	From Component Number	To Component Type	To Component Number	Percent Flow	Begin Date	End Date

11.4 Source Classification Code (SCC) Listing for Alternative Operation

Give a complete listing of all fuels burned, products produced by a process or waste incinerated for this alternative operating scenario.

Fuel	Associated SCC	Max. Throughput Rate	Firing Sequence

11.5 Alternative Fuel Physical Characteristics

Give a complete listing of all fuels physical characteristics for this alternative operating scenario.

SCC/Fuel Burned	FML	% Sulfur	% Ash	BTU Content (Units)

11.6 Alternative Process/Product Description

a. Briefly describe the change(s) in raw materials and/or process methods used in this operating scenario, if applicable:

b. Provide and briefly describe the process SCC associated with this alternative operating scenario:

Process SCC:		SCC Description:	

c. Alternative Product(s):

Please read instructions carefully before completing this application.

11.7 Source Potential to Emit

Give Potential Emission estimate for all air pollutants emitted at this source for this operating scenario.

Pollutant or CAS Number	Fuel	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

Section 12 – Compliance Plan for the Facility

		Yes	No
12.1	Will your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements during the permit duration?	☒	☐
12.2	Will your facility be in compliance with all applicable requirements presently scheduled to take effect during the term of the permit?	☒	☐
12.3	Will these requirements be met by the regulatory required dates?	☒	☐

If you checked "NO" in part 12.1, 12.2 or 12.3, answer the following questions:

12.4 Identify applicable requirement(s) for which compliance is not or will not be achieved:

Source ID Number	Citation Number

12.4.1 Briefly describe how compliance with this/these applicable requirement(s) will be achieved:

12.4.2. Provide a detailed schedule of compliance for the non-complying sources or activities identified in this section of the application. Include an enforceable sequence of corrective actions with milestone and projected compliance dates.

Date	Action/Milestone

12.4.3. Indicate the submittal frequency for the progress report(s): _____

12.4.4. Starting date for the submittal of the progress report(s): _____

Please read instructions carefully before completing this application.

Section 13 – Certification of Compliance for Synthetic Minor Source

In order for this Synthetic Minor facility to avoid the State-Only Operating Permit requirements, the applicant must agree to be bound by the emissions limitation(s) and/or restriction(s) contained in this application. In addition, the applicant must agree that these emission limitation(s) are enforceable by the Department, the Environmental Protection Agency and the citizens.

13.1 Schedule for Compliance Certification Submission

a. Frequency of submittal: Facility is a natural source

b. Beginning date: _____

13.2 Certification of Compliance (for Synthetic Minor Facility only)

I certify under the penalty of 18 Pa. CS 4904 (b) (2) that the sources covered by this application will comply with the emission limitations and other requirements contained in this application and all previously issued plan approvals and operating permits. I further certify that, based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate, and complete.

(Signed) _____ Date _____

Name (Typed) _____

Title: _____

Addendum 1s'

2700-PM-AQ0016 11/2001

COMMONWEALTH OF PENSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1
METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT

Federal Tax ID 30-0528059

Firm Name MarkWest Liberty Midstream & Resources, LLC

Plant Code

Plant Name Houston Gas Plant

Applicable Requirement for: (check only one)

- ☐ Entire Site
- ☒ Group of Sources — Group ID: Group #1 (Gas-Fired Rich-Burn Engines.)
- ☐ Single Source — Unit ID:
- ☐ Alternative Operating Scenario — Scenario Name:

Citation No. 40 CFR 60 NSPS Subpart JJJJ

Compliance Method Based Upon ☐ Applicable Requirement ☐ CAM ☐ Other

Method of Compliance Type: [check all that apply and complete all appropriate section(s)]

- ☒ Monitoring
- ☒ Testing
- ☒ Reporting
- ☒ Record Keeping
- ☐ Work Practice Standard

SECTION B. MONITORING

Monitoring Device Type (stack test, CEM, etc.) Stack Test

Monitoring Device Location

Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.
NOx and CO will be tested quarterly to ensure within limits.

How will data be reported?

SECTION C. TESTING

Reference Test Method Description Annual test of NOx, CO, VOC to ensure within limits

Reference Test Method Citation 40 CFR 60 NSPS Subpart JJJJ

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.
All maintenance events and results of stack monitoring and testing

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.
Reports upon completion of testing as required in NSPS Subpart JJJJ and annual report as required by the Department stating overall compliance.

Reporting Start Date Upon issuance of permit

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Section 6
Emission Estimates

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Summary of Potential Emissions

Criteria Pollutant Potential Emissions

Process/Facility	Potential Emissions (lb/hr)					
	NOx	CO	VOC[1]	SO_2	PM[2]	HAPs
(2) Waukesha L7042GSI w/ NSCR	1.31	1.63	1.11	0.01	0.23	0.34
(8) Waukesha P9390GSI w/ NSCR	6.98	9.08	4.19	0.07	1.23	1.82
TEG Dehydration Unit	--	--	0.44	--	--	0.07
Dehydration Unit Reboiler	0.20	0.16	0.01	0.00	0.01	0.00
Flare	0.08	0.34	--	0.00	0.00	--
Tanks controlled by VRU	--	--	0.62	--	--	0.03
Condensate Loadout	--	--	--	--	--	--
Fugitives	--	--	0.60	--	--	0.02
Blowdowns	--	--	--	--	--	--
Pigging Operations (RFD)	--	--	--	--	--	--
Crankcase Vents	0.25	0.32	0.16	0.00	0.04	--
Site Wide Emissions (lb/hr)	**8.82**	**11.54**	**7.12**	**0.09**	**1.52**	**2.28**

[1] VOC as shown in this table includes formaldehyde.
[2] $PM = PM_{10} = PM_{2.5}$

Process/Facility	Potential Emissions (tpy)					
	NOx	CO	VOC[1]	SO_2	PM[2]	HAPs
(2) Waukesha L7042GSI w/ NSCR	5.72	7.15	4.86	0.06	0.99	1.47
(8) Waukesha P9390GSI w/ NSCR	30.59	39.77	18.35	0.32	5.40	7.97
TEG Dehydration Unit	--	--	1.91	--	--	0.29
Dehydration Unit Reboiler	0.86	0.72	0.05	0.01	0.07	0.02
Flare	0.36	1.51	--	0.00	0.00	--
Tanks controlled by VRU	--	--	2.70	--	--	0.15
Condensate Loadout	--	--	0.03	--	--	0.00
Fugitives	--	--	2.63	--	--	0.07
Blowdowns	--	--	11.01	--	--	0.14
Pigging Operations (RFD)	--	--	1.04	--	--	0.02
Crankcase Vents	1.09	1.41	0.70	0.01	0.19	--
Site Wide Emissions (tpy)	**38.61**	**50.55**	**43.28**	**0.39**	**6.65**	**10.13**

[1] VOC as shown in this table includes formaldehyde.
[2] $PM = PM_{10} = PM_{2.5}$

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Summary of Potential Emissions

Hazardous Air Pollutant Potential Emissions

Process/Facility	HAPs - Potential Emissions (lb/hr)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
(2) Waukesha L7042GSI w/ NSCR	3.59E-02	5.63E-04	1.27E-02	4.43E-03	--	6.53E-02
(8) Waukesha P9390GSI w/ NSCR	1.95E-01	3.06E-03	6.89E-02	2.41E-02	--	3.49E-01
TEG Dehydration Unit	9.98E-03	--	2.20E-02	1.39E-02	1.96E-02	--
Dehydration Unit Reboiler	4.12E-06	--	6.67E-06	--	3.53E-03	1.47E-04
Flare	--	--	--	--	--	--
Tanks controlled by VRU	0.00E+00	0.00E+00	3.73E-03	0.00E+00	3.08E-02	--
Condensate Loadout	--	--	--	--	--	--
Fugitives	--	--	--	--	--	--
Blowdowns	--	--	--	--	--	--
Pigging Operations (RFD)	--	--	--	--	--	--
Crankcase Vents	6.93E-03	2.45E-03	2.45E-03	8.55E-04	--	--
Site Wide Emissions (lb/hr)	**0.25**	**0.01**	**0.11**	**0.04**	**0.05**	**0.41**

Process/Facility	HAPs - Potential Emissions (tpy)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
(2) Waukesha L7042GSI w/ NSCR	1.57E-01	2.47E-03	5.55E-02	1.94E-02	--	2.86E-01
(8) Waukesha P9390GSI w/ NSCR	8.54E-01	1.34E-02	3.02E-01	1.05E-01	--	1.53E+00
TEG Dehydration Unit	4.37E-02	--	9.63E-02	6.07E-02	8.58E-02	--
Dehydration Unit Reboiler	1.80E-05	--	2.92E-05	--	1.55E-02	6.44E-04
Flare	--	--	--	--	--	--
Tanks controlled by VRU	0.00E+00	0.00E+00	1.64E-02	0.00E+00	1.35E-01	--
Condensate Loadout	0.00E+00	0.00E+00	1.01E-03	0.00E+00	2.91E-03	--
Fugitives	--	--	--	--	--	--
Blowdowns	3.32E-03	0.00E+00	1.80E-02	2.33E-03	2.47E-01	--
Pigging Operations (RFD)	5.05E-04	--	5.05E-04	1.01E-03	2.07E-02	--
Crankcase Vents	3.03E-02	4.76E-04	1.07E-02	3.74E-03	--	--
Site Wide Emissions (tpy)	**1.09**	**0.02**	**0.50**	**0.19**	**0.51**	**1.82**

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Summary of Greenhouse Gas Emissions

GHG Potential To Emit

Process/Facility	GHG - Potential Emissions (tpy) in CO2(e)		
	CO_2	CH_4	N_2O
Reboiler	1126.33	0.53	0.63
Flare Pilot + Purge Gas	46.12	0.02	0.03
Dehydrator Flare	648.10	44.30	--
(2) Waukesha L7042GSI w/ NSCR	12794.00	6.03	7.19
(8) Waukesha P9390 w/ NSCR	69508.90	32.77	39.07
Tanks controlled by VRU	0.00	5.30	--
Fugitives	--	115.28	--
Blowdowns	0.04	337.80	--
Pigging Operations (RFD)	0.00	7.68	--
GP-9 Source	2427.07	0.25	5.87
Total	86550.58	549.96	52.79

Total CO2(e) **87153.33**

GHG Calculations
MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Fugitive GHG Calculation

Equipment type	Stream Type (Gas/Liquid etc)	CO2(e) for CH4 Emissions
Connectors/Flanges	Natural Gas	25.84
Connectors/Flanges	Light Oil	0.00
Connectors/Flanges	Water/Light Oil	0.14
Compressors	Natural Gas	2.38
Open-Ended Lines	Natural Gas	0.00
Pump Seals	Natural Gas	0.00
Pump Seals	Light Oil	0.00
Pump Seals	Water/Light Oil	0.00
Valves	Natural Gas	86.89
Valves	Light Oil	0.00
Valves	Water/Light Oil	0.03
CO2(e) from CH4		115.28

*Taken from Gas Analysis and Condensate Analysis

** Global warming potential from 40 CFR 98, "2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determination for New or Substantially Revised Data Elemetns". Table 2 - GHGs with Revised GWPs for Table A-1.

Dehydrator GHG Calculation

Constituent	Uncontrolled Emission Rate (tpy)	Controlled Emission Rate (tpy)	Carbon from Combustion (tpy)	CO2 Emissions (tpy)
Methane	88.6041	1.7721	64.9616	238.2467
Ethane	42.5359	0.8507	33.2705	122.0197
Propane	35.4803	0.7096	28.3842	104.0992
Isobutane	5.7537	0.1151	4.6568	17.0788
n-Butane	21.3028	0.4261	17.2416	63.2336
Isopentane	4.2821	0.0856	3.4898	12.7989
n-Pentane	8.1468	0.1629	6.6394	24.3501
n-Hexane	3.7161	0.0743	3.0426	11.1587
Cyclohexane	1.5182	0.0304	1.2728	4.6681
Other Hexanes	3.5229	0.0705	2.9536	10.8322
Heptanes	5.5472	0.1109	4.5569	16.7125
C8+ Heavies	7.5806	0.1516	6.2450	22.9037
Total CO2				648.1021
CO2(e) from CH4				44.3025

GHG Calculations
MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Reboiler

Equipment	Heat Input (LHV) (mmbtu/hr)	Heat Input (HHV) (mmbtu/hr)	Emission Factors* CO2 (lb/mmbtu)	CH4 (lb/mmbtu)	N20 (lb/mmbtu)	CO2(e) CO2 Emission Rate (tpy)	CO2(e)** CH4 Emission Rate (tpy)	CO2(e)** N2O Emission Rate (tpy)
Reboiler	2.0000	2.2000	116.8879	0.0022	0.0002	1126.33	0.53	0.63
Flare Pilot + Purge Gas	0.0819	0.0901	116.8879	0.0022	0.0002	46.12	0.02	0.03

* 40 CFR 98 Subpart C, Tables C-1 and C-2 for Natural Gas and converted to lb/mmbtu

** Global warming potential from 40 CFR 98, "2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determination for New or Substantially Revised Data Elemetns". Table 2 - GHGs with Revised GWPs for Table A-1.

Engines

Engine	HP	Fuel Use (LHV) (btu/bhp-hr)	Fuel Use (HHV) (btu/bhp-hr)	Fuel Use (HHV) (mmbtu/yr)	Emission Factors* CO2 (lb/mmbtu)	CH4 (lb/mmbtu)	N20 (lb/mmbtu)	CO2(e) CO2 Emission Rate (tpy)	CO2(e)** CH4 Emission Rate (tpy)	CO2(e)** N2O Emission Rate (tpy)
Wauk. L7042GSI	1,480	7675	8443	109455	116.8879	0.0022	0.0002	6397.00	3.02	3.60
Wauk. P9390GSI	1,980	7792	8571	148666	116.8879	0.0022	0.0002	8688.61	4.10	4.88
GP-9 Sources	197	137380	151118	14885	163.0537	0.0007	0.0013	1213.54	0.12	2.93

* 40 CFR 98 Subpart C, Tables C-1 and C-2 for Natural Gas and converted to lb/mmbtu

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Compressor Engine Emissions (Per Engine)

Source Designation:	
Manufacturer:	Waukesha
Model No.:	L7042GSI
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Field Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,050
Rated Horsepower (bhp):	1,480
Specific Fuel Consumption (Btu/bhp-hr)	7,675
Maximum Fuel Consumption at 100% Load (scf/hr):	10,818
Heat Input (MMBtu/hr)	11.36

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	94.77

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx	0.20	g/bhp-hr
CO	0.25	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
VOC	0.17	g/bhp-hr
Formaldehyde (HCHO)	0.01	g/bhp-hr

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NOx	0.65	2.86
CO	0.82	3.57
SO_2	0.01	0.03
PM_{10} (Filterable)	0.001	0.00
$PM_{2.5}$ (Filterable)	0.001	0.00
PM Condensable	0.11	0.49
PM Total	0.11	0.50
VOC	0.55	2.43
Formaldehyde (HCHO)	0.03	0.14

Hazardous Air Pollutant (HAP) Potential Emissions from Waukesha L7042 Engines

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	2.87E-04	1.26E-03
1,1,2-Trichloroethane	1.53E-05	1.74E-04	7.61E-04
1,3-Butadiene	6.63E-04	7.53E-03	3.30E-02
1,3-Dichloropropene	1.27E-05	1.44E-04	6.32E-04
Acetaldehyde	2.79E-03	3.17E-02	1.39E-01
Acrolein	2.63E-03	2.99E-02	1.31E-01
Benzene	1.58E-03	1.79E-02	7.86E-02
Carbon Tetrachloride	1.77E-05	2.01E-04	8.81E-04
Chlorobenzene	1.29E-05	1.47E-04	6.42E-04
Chloroform	1.37E-05	1.56E-04	6.82E-04
Ethylbenzene	2.48E-05	2.82E-04	1.23E-03
Ethylene Dibromide	2.13E-05	2.42E-04	1.06E-03
Methanol	3.06E-03	3.48E-02	1.52E-01
Methylene Chloride	4.12E-05	4.68E-04	2.05E-03
Naphthalene	9.71E-05	1.10E-03	4.83E-03
PAH	1.41E-04	1.60E-03	7.02E-03
Styrene	1.19E-05	1.35E-04	5.92E-04
Toluene	5.58E-04	6.34E-03	2.78E-02
Vinyl Chloride	7.18E-06	8.16E-05	3.57E-04
Xylene	1.95E-04	2.22E-03	9.70E-03
Total HAP (Includes Formaldehyde)	**1.47E-02**	**0.17**	**0.74**

[a] SO_2, PM, and HAP emission factors (excluding HCHO) from AP-42 Section 3.2, Table 3.2-3"Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines," Supplement F, July 2000. NO_X, VOC, CO, and formaldehyde emission factors are based on manufacturer's data.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions} \times$ (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Compressor Engine Emissions (Per Engine)

Source Designation:	
Manufacturer:	Waukesha
Model No.:	P9390GSI
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Field Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,050
Rated Horsepower (bhp):	1,980
Specific Fuel Consumption (Btu/bhp-hr)	7,792
Maximum Fuel Consumption at 100% Load (scf/hr):	14,693
Heat Input (MMBtu/hr)	15.43

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	128.71

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx	0.20	g/bhp-hr
CO	0.26	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
VOC	0.12	g/bhp-hr
Formaldehyde (HCHO)	0.01	g/bhp-hr

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NOx	0.87	3.82
CO	1.13	4.97
SO_2	0.01	0.04
PM_{10} (Filterable)	0.001	0.01
$PM_{2.5}$ (Filterable)	0.001	0.01
PM Condensable	0.15	0.67
PM Total	0.15	0.67
VOC	0.52	2.29
Formaldehyde (HCHO)	0.04	0.19

Hazardous Air Pollutant (HAP) Potential Emissions from Waukesha P9390 Engines

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	3.90E-04	1.71E-03
1,1,2-Trichloroethane	1.53E-05	2.36E-04	1.03E-03
1,3-Butadiene	6.63E-04	1.02E-02	4.48E-02
1,3-Dichloropropene	1.27E-05	1.96E-04	8.58E-04
Acetaldehyde	2.79E-03	4.30E-02	1.89E-01
Acrolein	2.63E-03	4.06E-02	1.78E-01
Benzene	1.58E-03	2.44E-02	1.07E-01
Carbon Tetrachloride	1.77E-05	2.73E-04	1.20E-03
Chlorobenzene	1.29E-05	1.99E-04	8.72E-04
Chloroform	1.37E-05	2.11E-04	9.26E-04
Ethylbenzene	2.48E-05	3.83E-04	1.68E-03
Ethylene Dibromide	2.13E-05	3.29E-04	1.44E-03
Methanol	3.06E-03	4.72E-02	2.07E-01
Methylene Chloride	4.12E-05	6.36E-04	2.78E-03
Naphthalene	9.71E-05	1.50E-03	6.56E-03
PAH	1.41E-04	2.18E-03	9.53E-03
Styrene	1.19E-05	1.84E-04	8.04E-04
Toluene	5.58E-04	8.61E-03	3.77E-02
Vinyl Chloride	7.18E-06	1.11E-04	4.85E-04
Xylene	1.95E-04	3.01E-03	1.32E-02
Total HAP (Includes Formaldehyde)	**1.46E-02**	**0.23**	**1.00**

[a] SO_2, PM, and HAP emission factors (excluding HCHO) from AP-42 Section 3.2, Table 3.2-3"Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines," Supplement F, July 2000. NO_X, VOC, CO, and formaldehyde emission factors are based on manufacturer's data.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Glycol Dehydrator Emissions

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY

EMISSION RATES

	Pre-Control Emissions			Post Control Emissions		
Pollutant	**(lbs/hr)**	**(lbs/day)**	**(tons/yr)**	**(lbs/hr)**	**(lbs/day)**	**(tons/yr)**
Methane	19.8733	476.9592	87.045054	0.3975	9.539	1.7409
Ethane	8.0156	192.3744	35.108328	0.1603	3.847	0.7022
Propane	6.3918	153.4032	27.996084	0.1278	3.068	0.5599
Isobutane	1.0561	25.3464	4.625718	0.0211	0.507	0.0925
n-Butane	3.5874	86.0976	15.712812	0.0717	1.722	0.3143
Isopentane	0.988	23.712	4.32744	0.0198	0.474	0.0865
n-Pentane	1.6855	40.452	7.38249	0.0337	0.809	0.1476
n-Hexane	0.98	23.52	4.2924	0.0196	0.470	0.0858
Cyclohexane	0.5030	12.072	2.20314	0.0101	0.241	0.0441
Other Hexanes	0.9141	21.9384	4.003758	0.0183	0.439	0.0801
Heptanes	1.1902	28.5648	5.213076	0.0238	0.571	0.1043
Methylcyclohexane	0.6273	15.0552	2.747574	0.0125	0.301	0.0550
Benzene	0.499	11.976	2.18562	0.0100	0.240	0.0437
Toluene	1.0991	26.3784	4.814058	0.0220	0.528	0.0963
Xylenes	0.6929	16.6296	3.034902	0.0139	0.333	0.0607
C8+ Heavies	1.6146	38.7504	7.071948	0.0323	0.775	0.1414
Total Emissions	49.7179	1193.2296	217.7644	0.9944	23.8646	4.3553
Total VOC Emissions	21.8290	523.8960	95.6110	0.4366	10.4779	1.9122
Total HAP Emissions	3.2710	78.5040	14.3270	0.0654	1.5701	0.2865

See attached GRI-GLYCalc run for more information

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Flare

Pilot Light + Purge Gas

Source Designation:	
Manufacturer:	Jordan
Operating Hours: (hr/yr)	8,760
Pilot + Purge Gas Heat Input (MMBtu/hr)	0.082
Pilot + Purge Gas Annual Fuel Use (mmscf/yr)	0.683
Pilot Fuel Consumption (mmscf/hr):	6.50E-05
Purge Fuel Consumption (mmscf/hr):	1.30E-05
Fuel HHV (Btu/scf)	1,050

Pollutant	Emission Factor (lb/mmscf)[a]
NOx	102.9
CO	86.5
SO2	0.6
PM Total	7.8
PM Condensable	2.0
PM10 (Filterable)	5.9
PM2.5 (Filterable)	5.9

[a] Emission factors from AP-42 Section 1.4 "Natural Gas
[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

Combustion of Hydrocarbons

Source Designation:	
Dehydrator Emissions (lb/hr)	49.72
MW	26.84
Hourly Gas Flow (scf/hr)	702
Annual Gas Flow (mmscf/yr)	6.15
Heating value (btu/scf)	1,552.93
Maximum Heat Release of Flare (mmbtu/hr)	1.09
Maximum Heat Release of Flare (mmbtu/yr)	9,552
NO_X Emission Rate (lb/mmbtu)	0.068
CO Emission Rate (lb/mmbtu)	0.31

[a] Emission factors from AP-42 Section 13.5 "Industrial Flares" Table 13.5-1

Total Emissions

Pollutant	lb/hr	tpy
NOx	8.22E-02	3.60E-01
CO	3.45E-01	1.51E+00
SO2	4.82E-05	2.11E-04
PM Total	6.10E-04	2.67E-03
PM Condensable	1.53E-04	6.68E-04
PM10 (Filterable)	4.58E-04	2.00E-03
PM 2.5 (Filterable)	4.58E-04	2.00E-03

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Dehydration Unit Reboiler

Source Designation:	
Fuel Used:	Field Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	2.00
Fuel Consumption (mmscf/hr):	1.90E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	102.9	0.196	0.859
CO	86.5	0.165	0.721
SO_2	0.6	0.001	0.005
PM Total	7.8	0.015	0.065
PM Condensable	5.9	0.011	0.049
PM_{10} (Filterable)	2.0	0.004	0.016
$PM_{2.5}$ (Filterable)	2.0	0.004	0.016
VOC	5.7	0.011	0.047

Hazardous Air Pollutant (HAP) Potential Emissions from Dehy Reboiler

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions	
		(lb/hr)[b]	(tons/yr)[c]
HAPs:			
3-Methylchloranthrene	1.85E-06	3.53E-09	1.55E-08
7,12-Dimethylbenz(a)anthracene	1.65E-05	3.14E-08	1.37E-07
Acenaphthene	1.85E-06	3.53E-09	1.55E-08
Acenaphthylene	1.85E-06	3.53E-09	1.55E-08
Anthracene	2.47E-06	4.71E-09	2.06E-08
Benz(a)anthracene	1.85E-06	3.53E-09	1.55E-08
Benzene	2.16E-03	4.12E-06	1.80E-05
Benzo(a)pyrene	1.24E-06	2.35E-09	1.03E-08
Benzo(b)fluoranthene	1.85E-06	3.53E-09	1.55E-08
Benzo(g,h,i)perylene	1.24E-06	2.35E-09	1.03E-08
Benzo(k)fluoranthene	1.85E-06	3.53E-09	1.55E-08
Chrysene	1.85E-06	3.53E-09	1.55E-08
Dibenzo(a,h) anthracene	1.24E-06	2.35E-09	1.03E-08
Dichlorobenzene	1.24E-03	2.35E-06	1.03E-05
Fluoranthene	3.09E-06	5.88E-09	2.58E-08
Fluorene	2.88E-06	5.49E-09	2.40E-08
Formaldehyde	7.72E-02	1.47E-04	6.44E-04
Hexane	1.85E+00	3.53E-03	1.55E-02
Indo(1,2,3-cd)pyrene	1.85E-06	3.53E-09	1.55E-08
Phenanthrene	1.75E-05	3.33E-08	1.46E-07
Pyrene	5.15E-06	9.80E-09	4.29E-08
Toluene	3.50E-03	6.67E-06	2.92E-05
Arsenic	2.06E-04	3.92E-07	1.72E-06
Beryllium	1.24E-05	2.35E-08	1.03E-07
Cadmium	1.13E-03	2.16E-06	9.45E-06
Chromium	1.44E-03	2.75E-06	1.20E-05
Cobalt	8.65E-05	1.65E-07	7.21E-07
Lead	5.15E-04	9.80E-07	4.29E-06
Manganese	3.91E-04	7.45E-07	3.26E-06
Mercury	2.68E-04	5.10E-07	2.23E-06
Nickel	2.16E-03	4.12E-06	1.80E-05
Selenium	2.47E-05	4.71E-08	2.06E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	4.57E-08	2.00E-07
Naphthalene	6.10E-04	1.16E-06	5.09E-06
Total HAP		**3.70E-03**	**1.62E-02**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 (07/98) for all criteria and HAP pollutants, corrected to site-specific gas heat content.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Tanks - Controlled by VRU

Control Percentage	98%
Component	Gasoline (RVP 15)

Source	2 x 400 bbl Condensate Tanks & 1 X 500 bbl Gunbarrel Tank Uncontrolled Emissions (lb/yr)		
	Condensate Per Tank	Gunbarrel Per Tank	Total
Working Loss*	2,099.65		4,199.30
Breathing Loss	3,365.94	3,365.94	10,097.82
Total Emissions	5,465.59	3,365.94	14,297.12

a - Gunbarrel tanks operate at constant level and do not experience working losses.

Throughput	
Condensate Throughput	
(bbl/day)	gal/yr
24.19	370,833

Component	Mass In NGL %	Flash Emissions				W&B Emissions				Total Emissions			
		Total Uncontrolled Emissions		Total Controlled Emissions[1]		Total Uncontrolled Emissions		Total Controlled Emissions		Total Uncontrolled Emissions		Total Controlled Emissions	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Oxygen	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Nitrogen	1.51E-07	0.0073	0.03	0.00	0.00	0.0000	0.00	0.00	0.00	0.0073	0.03	0.00	0.00
Carbon Dioxide	4.92E-06	0.0243	0.11	0.00	0.00	0.0000	0.00	0.00	0.00	0.0243	0.11	0.00	0.00
Methane	1.77E-04	2.4201	10.60	0.05	0.21	0.0003	0.00	0.00	0.00	2.4204	10.60	0.05	0.21
Ethane	2.25E-03	5.0166	21.97	0.10	0.44	0.0037	0.02	0.00	0.00	5.0202	21.99	0.10	0.44
Propane	1.60E-02	9.2939	40.71	0.19	0.81	0.0261	0.11	0.00	0.00	9.3200	40.82	0.19	0.82
i-Butane	9.56E-03	2.0803	9.11	0.04	0.18	0.0156	0.07	0.00	0.00	2.0959	9.18	0.04	0.18
n-butane	4.76E-02	7.1702	31.41	0.14	0.63	0.0779	0.34	0.00	0.01	7.2481	31.75	0.14	0.63
i-Pentane	3.82E-02	2.1965	9.62	0.04	0.19	0.0625	0.27	0.00	0.01	2.2590	9.89	0.05	0.20
n-Pentane	8.27E-02	3.4863	15.27	0.07	0.31	0.1352	0.59	0.00	0.01	3.6216	15.86	0.07	0.32
2,2-Dimethylbutane	4.11E-03	0.0981	0.43	0.00	0.01	0.0067	0.03	0.00	0.00	0.1048	0.46	0.00	0.01
2-Methyl Pentane	4.59E-02	0.8051	3.53	0.02	0.07	0.0751	0.33	0.00	0.01	0.8803	3.86	0.02	0.08
3-Methyl Pentane	3.95E-02	0.6121	2.68	0.01	0.05	0.0646	0.28	0.00	0.01	0.6767	2.96	0.01	0.06
n-Hexane	11.02%	1.3594	5.95	0.03	0.12	0.1803	0.79	0.00	0.02	1.5397	6.74	0.03	0.13
Methylcyclopentane	1.74E-02	0.2055	0.90	0.00	0.02	0.0285	0.12	0.00	0.00	0.2340	1.03	0.00	0.02
Benzene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Cyclohexane	1.10E-02	0.1035	0.45	0.00	0.01	0.0181	0.08	0.00	0.00	0.1215	0.53	0.00	0.01
2-Methyl Hexane	4.99E-02	0.2598	1.14	0.01	0.02	0.0816	0.36	0.00	0.01	0.3414	1.50	0.01	0.03
3-Methyl Hexane	5.22E-02	0.2606	1.14	0.01	0.02	0.0854	0.37	0.00	0.01	0.3460	1.52	0.01	0.03
Dimethylcyclopentanes	3.18E-02	0.1301	0.57	0.00	0.01	0.0520	0.23	0.00	0.00	0.1821	0.80	0.00	0.02
n-Heptane	10.53%	0.4008	1.76	0.01	0.04	0.1723	0.75	0.00	0.02	0.5731	2.51	0.01	0.05
Methylcyclohexane	6.00E-02	0.2550	1.12	0.01	0.02	0.0982	0.43	0.00	0.01	0.3532	1.55	0.01	0.03
Trimethylcyclopentanes	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Toluene	3.83E-02	0.1241	0.54	0.00	0.01	0.0626	0.27	0.00	0.01	0.1867	0.82	0.00	0.02
2-Methyl Heptane	9.57E-02	0.1622	0.71	0.00	0.01	0.1566	0.69	0.00	0.01	0.3188	1.40	0.01	0.03
3-Methyl Heptane	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Dimethylcyclohexanes	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
n-Octane	14.22%	0.1680	0.74	0.00	0.01	0.2326	1.02	0.00	0.02	0.4006	1.75	0.01	0.04
Ethyl Benzene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Xylene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
C9 Naphthenes	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
C9 Paraffins	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
n-Nonane	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Decanes Plus	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Water	7.41E-05	0.3379	1.48	0.01	0.03	0.0001	0.00	0.00	0.00	0.3381	1.48	0.01	0.03
Total	100.00%	36.98	161.96	0.74	3.24	1.64	7.17	0.03	0.14	38.61	169.13	0.77	3.38
Total VOC	99.75%	29.17	127.77	0.58	2.56	1.63	7.15	0.03	0.14	30.80	134.92	0.62	2.70
Total HAP	14.85%	1.48	6.50	0.03	0.13	0.24	1.06	0.00	0.02	1.73	7.56	0.03	0.15

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

LDAR Monitoring Yes

Fugitive Leaks

Equipment type	Count	Leak Emission Factors lb/hr/component[a]	Source of Leak Emission Factors (Specify if EPA protocol or others)	Stream Type (Gas/Liquid etc)	Gas VOC Wt%[b]	Gas HAP Wt %	Gas CH4 Wt%	Light Oil VOC Wt %[d]	Light Oil HAP Wt %	Light Oil CH4 Wt%	Control Percentage[c]	Pre-Control VOC Potential Emissions (lb/hr)	Potential VOC Emissions (lb/hr)	Potential VOC Emissions (tpy)	Pre-Control Potential HAP Emissions (lb/hr)	Potential HAP Emissions (lb/hr)	Potential HAP Emissions (tpy)
Connectors/Flanges	1362	0.00044	EPA Protocol	Natural Gas	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	30.00%	0.1394	0.0975	0.4273	0.0034	0.0024	0.0105
Connectors/Flanges	0	0.00046	EPA Protocol	Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	30.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Connectors/Flanges	822	0.000243	EPA Protocol	Water/Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	30.00%	0.1993	0.1395	0.6112	0.0061	0.0043	0.0188
Compressors	8	0.01940	EPA Protocol	Natural Gas	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0360	0.0090	0.0394	0.0009	0.0002	0.0010
Open-Ended Lines	0	0.00441	EPA Protocol	Natural Gas	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	0	0.00529	EPA Protocol	Natural Gas	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	0	0.02866	EPA Protocol	Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	8	0.00005	EPA Protocol	Water/Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0004	0.0001	0.0005	0.0000	0.0000	0.0000
Valves	570	0.00992	EPA Protocol	Natural Gas	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	1.3122	0.3281	1.4369	0.0322	0.0081	0.0353
Valves	0	0.00551	EPA Protocol	Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Valves	492	0.00022	EPA Protocol	Water/Light Oil	23.20%	0.57%	56.13%	100.00%	3.07%	0.92%	75.00%	0.0797	0.0266	0.1164	0.0033	0.0008	0.0036
				Total								1.7671	0.6008	2.6316	0.0459	0.0158	0.0691

[a] *Table 2-4. Oil & Gas Production Operations Average Emission Factors, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.*

[b] *VOC and HAP weight percent based on representative gas analysis.*

[c] *Based on Texas Commission on Environmental Quality (TCEQ) 28VHP Control Program and guidance titled "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives".*

[d] *No analysis for Water/Light Oil so assume it is same VOC percentage as Light Oil to be conservative.*

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Blowdown and ESD Emission Estimates

	Type of Compressor Engine	Number of Engines	Compressor Blowdown Volume* (scf)	Gas Density (lb/scf)	Gas Emitted Per Blowdown (lbs)	Blowdowns/ Year/ Engine	VOC (wt%)	HAPs (wt%)	CO2 (wt%)	CH4 (wt%)	Total Blowdown Emissions VOC (TPY)	HAPs (TPY)	CO2 (TPY)	CH4 (TPY)
Three Brothers CS	Waukesha L7042GSI	2	2015	0.0558	112	36	23%	0.57%	0.18%	56%	0.94	0.02	0.01	2.26
Three Brothers CS	Waukesha P9390GSI	8	2896	0.0558	162	36	23%	0.57%	0.18%	56%	5.40	0.13	0.04	12.99

* Compressor Blowdown Volume is based on the total volume of all piping for the specific engine make and model.

** Gas emitted per blowdown (lbs) = Compressor Blowdown Volume (ft^3) x Gas Density at Inlet Pressure (lb/ft^3)

Notes: - All engine blowdowns are routed to the station inlet. Any gas remaining that is below the inlet pressure is released to atmosphere
- Inlet Pressure (psig) is conservative. Average pressures observed over the past year have been well below this value.

	Type of Blowdown	Gas Emitted Per ESD*** (lbs)	Number of ESD per year	VOC (wt%)	HAPs (wt%)	CO2 (wt%)	CH4 (wt%)	Total ESD Emissions VOC (TPY)	HAPs (TPY)	CO2 (TPY)	CH4 (TPY)
Three Brothers CS	Emergency Shutdown	10075	4	23%	0.57%	0.18%	56%	4.68	0.11	0.04	11.25

*** Gas Emitted Per ESD is based on the site-specific volume of all piping and gas pressures observed at the Three Brothers CS for an uncontrolled emergency shutdown (ESD)

Pollutant	Constituent Weight Percent (%)	Total HAP Emissions (tpy)
Benzene	0.01%	0.0033
Toluene	0.04%	0.0180
Ethylbenzene	0.00%	0.0000
n-hexane	0.52%	0.2468
Xylenes	0.00%	0.0023

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Condensate Truck Loadout Emissions

Station	Volume Loaded (gal/yr)	Saturation Factor[1]	Vapor Pressure[2] (psia)	Vapor Molecular Weight[2] (lb/lb-mol)	Liquid Temp[3] (°F)	Liquid Temp (°R)	Loading Loss[4] (lb VOC/1000 gal)	Loading Loss[5] (lb/yr)	(tpy)
Three Brothers C	370,833	0.6	8.16	60	53.39	513	7.1	52.88	0.03

[1] From AP-42 Table 5.2-1, for tank trucks in submerged loading: dedicated normal service
[2] From AP42 Table 7.1-2, Gasoline (RVP 15), 60 deg
[3] Daily average liquid surface temperature (TANKS 4.09d)
[4] Loading Loss (lb VOC/1000 gal) = (12.46*S*P*M)/T [AP42 Section 5.2 (1/95)]
[5] Loading Loss (lb/yr) = loading loss (lb VOC/1000 gal)*(1-.98)

Pollutant	Percent of VOC in Flash Emissions (%)	HAPs Emissions (tpy)
Benzene	0.00%	0.0000
Toluene	3.83E-02	0.0010
Ethylbenzene	0.00%	0.0000
n-hexane	11.02%	0.0029
Xylenes	0.00%	0.0000

MarkWest Liberty Midstream and Resources, L.L.C.
Three Brothers Compressor Station

Crankcase Blowby Percentage[1] 3%

Pollutant	Total Engine Emissions		Blowby Percentage	Blowby Emissions	
	lb/hr	tpy		lb/hr	tpy
NO_X	8.29	36.31	3%	0.25	1.09
CO	10.71	46.91		0.32	1.41
VOC	5.30	23.21		0.16	0.70
SO_2	0.09	0.38		0.00	0.01
PM	1.46	6.39		0.04	0.19
Benzene	0.23	1.01		0.01	0.03
Toluene	0.08	0.36		0.00	0.01
Ethylbenzene	0.00	0.02		0.00	0.00
Xylenes	0.03	0.12		0.00	0.00
Total HAPs	2.16	7.96		0.06	0.24

MarkWest Liberty Midstream & Resources, L.L.C.
Three Brothers Compressor Station

Gas Analysis

Sample Date: 12/18/2017

Station: Three Brothers CS

Component	Mol %	Wt %	Wt% of TOC
Nitrogen	0.4300%	0.560%	--
Methane	75.4100%	55.840%	--
Carbon Dioxide	0.0900%	0.180%	--
Ethane	14.5600%	20.210%	--
Propane	6.0500%	12.310%	12.40%
I-Butane	0.5700%	1.530%	1.54%
N-Butane	1.6600%	4.450%	4.48%
I-Pentane	0.3100%	1.030%	1.04%
N-Pentane	0.4600%	1.530%	1.54%
I-Hexanes	0.1400%	0.570%	0.57%
N-Hexane	0.1300%	0.520%	0.52%
BENZENE	0.0020%	0.007%	0.01%
CycloHEXANE	0.0140%	0.054%	0.05%
Heptanes	0.1590%	0.735%	0.74%
Toluene	0.0090%	0.038%	0.04%
Octanes	0.0750%	0.395%	0.40%
Ethylbenzene	0.0000%	0.000%	0.00%
m,o,&p xylene	0.0010%	0.005%	0.00%
Nonanes	0.0040%	0.024%	0.02%
Decanes Plus	0.0010%	0.007%	0.01%

Total	100.08%	99.99%	
Total HC	99.56%	99.25%	
Total NMNE VOC	9.59%	23.20%	23.20%
Total HAPs	0.14%	0.57%	0.57%

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Three Brothers
City:	Pittsburgh
State:	Pennsylvania
Company:	Markwest
Type of Tank:	Vertical Fixed Roof Tank
Description:	3 Bros CS Condensate Tanks

Tank Dimensions

Shell Height (ft):		20.00
Diameter (ft):		12.00
Liquid Height (ft) :		20.00
Avg. Liquid Height (ft):		10.00
Volume (gallons):		16,920.59
Turnovers:		10.96
Net Throughput(gal/yr):		185,416.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		0.00
Slope (ft/ft) (Cone Roof)		0.06

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

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

Three Brothers - Vertical Fixed Roof Tank
Pittsburgh, Pennsylvania

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 15.0)	All	58.50	49.32	67.67	53.39	7.9267	6.6758	9.3559	60.0000			92.00	Option 4: RVP=15, ASTM Slope=3

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

Emissions Report for: Annual

Three Brothers - Vertical Fixed Roof Tank
Pittsburgh, Pennsylvania

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 15.0)	2,099.62	3,365.94	5,465.56

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Three Bros CS Dehydrator
File Name: S:\EH&S ENVIRONMENTAL\Working Files\Liberty M&R\Three Brothers\SOOP\Three Brothers Dehydrator.ddf
Date: September 06, 2018

DESCRIPTION:

Description: 120 MMSCFD TEG Dehydration

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.3975	9.539	1.7409
Ethane	0.1603	3.847	0.7022
Propane	0.1278	3.068	0.5599
Isobutane	0.0211	0.507	0.0925
n-Butane	0.0717	1.722	0.3143
Isopentane	0.0198	0.474	0.0865
n-Pentane	0.0337	0.809	0.1476
n-Hexane	0.0196	0.470	0.0858
Cyclohexane	0.0101	0.241	0.0441
Other Hexanes	0.0183	0.439	0.0801
Heptanes	0.0238	0.571	0.1043
Methylcyclohexane	0.0125	0.301	0.0549
Benzene	0.0100	0.240	0.0437
Toluene	0.0220	0.528	0.0963
Xylenes	0.0139	0.333	0.0607
C8+ Heavies	0.0323	0.775	0.1414
Total Emissions	0.9944	23.865	4.3553
Total Hydrocarbon Emissions	0.9944	23.865	4.3553
Total VOC Emissions	0.4366	10.478	1.9122
Total HAP Emissions	0.0654	1.570	0.2865
Total BTEX Emissions	0.0458	1.100	0.2007

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	19.8733	476.958	87.0449
Ethane	8.0156	192.375	35.1084
Propane	6.3918	153.404	27.9963
Isobutane	1.0561	25.346	4.6257
n-Butane	3.5874	86.098	15.7129
Isopentane	0.9880	23.712	4.3275

n-Pentane	1.6855	40.451	7.3824
n-Hexane	0.9800	23.520	4.2925
Cyclohexane	0.5030	12.071	2.2030
Other Hexanes	0.9141	21.939	4.0039
Heptanes	1.1902	28.565	5.2130
Methylcyclohexane	0.6273	15.054	2.7474
Benzene	0.4990	11.975	2.1855
Toluene	1.0991	26.378	4.8140
Xylenes	0.6929	16.630	3.0349
C8+ Heavies	1.6146	38.751	7.0721
Total Emissions	49.7179	1193.229	217.7643
Total Hydrocarbon Emissions	49.7179	1193.229	217.7643
Total VOC Emissions	21.8290	523.896	95.6110
Total HAP Emissions	3.2710	78.504	14.3269
Total BTEX Emissions	2.2910	54.983	10.0344

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	111.5222	2676.533	488.4673
Ethane	45.0960	1082.304	197.5204
Propane	29.0721	697.731	127.3359
Isobutane	3.9046	93.709	17.1020
n-Butane	11.3341	272.017	49.6431
Isopentane	2.6690	64.055	11.6900
n-Pentane	3.8422	92.212	16.8288
n-Hexane	1.3076	31.381	5.7271
Cyclohexane	0.2308	5.540	1.0111
Other Hexanes	1.5831	37.995	6.9341
Heptanes	0.7805	18.731	3.4185
Methylcyclohexane	0.2000	4.801	0.8761
Benzene	0.0197	0.473	0.0864
Toluene	0.0252	0.604	0.1103
Xylenes	0.0050	0.121	0.0220
C8+ Heavies	0.2188	5.250	0.9582
Total Emissions	211.8108	5083.459	927.7313
Total Hydrocarbon Emissions	211.8108	5083.459	927.7313
Total VOC Emissions	55.1926	1324.622	241.7436
Total HAP Emissions	1.3575	32.580	5.9458
Total BTEX Emissions	0.0499	1.198	0.2187

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.3975	9.539	1.7409
Ethane	0.1603	3.847	0.7022
Propane	0.1278	3.068	0.5599
Isobutane	0.0211	0.507	0.0925
n-Butane	0.0717	1.722	0.3143
Isopentane	0.0198	0.474	0.0865
n-Pentane	0.0337	0.809	0.1476
n-Hexane	0.0196	0.470	0.0858
Cyclohexane	0.0101	0.241	0.0441
Other Hexanes	0.0183	0.439	0.0801
Heptanes	0.0238	0.571	0.1043
Methylcyclohexane	0.0125	0.301	0.0549
Benzene	0.0100	0.240	0.0437
Toluene	0.0220	0.528	0.0963
Xylenes	0.0139	0.333	0.0607
C8+ Heavies	0.0323	0.775	0.1414
Total Emissions	0.9944	23.865	4.3553
Total Hydrocarbon Emissions	0.9944	23.865	4.3553
Total VOC Emissions	0.4366	10.478	1.9122
Total HAP Emissions	0.0654	1.570	0.2865
Total BTEX Emissions	0.0458	1.100	0.2007

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	575.5122	1.7409	99.70
Ethane	232.6288	0.7022	99.70
Propane	155.3322	0.5599	99.64
Isobutane	21.7277	0.0925	99.57
n-Butane	65.3561	0.3143	99.52
Isopentane	16.0175	0.0865	99.46
n-Pentane	24.2112	0.1476	99.39
n-Hexane	10.0196	0.0858	99.14
Cyclohexane	3.2141	0.0441	98.63
Other Hexanes	10.9380	0.0801	99.27
Heptanes	8.6315	0.1043	98.79
Methylcyclohexane	3.6235	0.0549	98.48
Benzene	2.2718	0.0437	98.08
Toluene	4.9243	0.0963	98.04
Xylenes	3.0570	0.0607	98.01
C8+ Heavies	8.0302	0.1414	98.24
Total Emissions	1145.4956	4.3553	99.62
Total Hydrocarbon Emissions	1145.4956	4.3553	99.62
Total VOC Emissions	337.3546	1.9122	99.43
Total HAP Emissions	20.2727	0.2865	98.59

Total BTEX Emissions	10.2531	0.2007	98.04

EQUIPMENT REPORTS:

COMBUSTION DEVICE

Ambient Temperature:	53.00 deg. F
Excess Oxygen:	30.00 %
Combustion Efficiency:	98.00 %
Supplemental Fuel Requirement:	4.00e-001 MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%
Cyclohexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Methylcyclohexane	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
Xylenes	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

Calculated Absorber Stages:	1.60
Specified Dry Gas Dew Point:	7.00 lbs. H2O/MMSCF
Temperature:	110.0 deg. F
Pressure:	1050.0 psig
Dry Gas Flow Rate:	120.0000 MMSCF/day
Glycol Losses with Dry Gas:	5.9316 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	75.07 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	1.32 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	9.31%	90.69%
Carbon Dioxide	99.92%	0.08%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%

Propane	99.97%	0.03%
Isobutane	99.97%	0.03%
n-Butane	99.96%	0.04%
Isopentane	99.97%	0.03%
n-Pentane	99.96%	0.04%
n-Hexane	99.94%	0.06%
Cyclohexane	99.75%	0.25%
Other Hexanes	99.95%	0.05%
Heptanes	99.91%	0.09%
Methylcyclohexane	99.76%	0.24%
Benzene	97.56%	2.44%
Toluene	96.99%	3.01%
Xylenes	95.09%	4.91%
C8+ Heavies	99.80%	0.20%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 70.0 deg. F
Flash Pressure: 55.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.95%	0.05%
Carbon Dioxide	11.55%	88.45%
Nitrogen	0.59%	99.41%
Methane	0.67%	99.33%
Ethane	2.51%	97.49%
Propane	7.00%	93.00%
Isobutane	11.26%	88.74%
n-Butane	15.16%	84.84%
Isopentane	18.22%	81.78%
n-Pentane	22.83%	77.17%
n-Hexane	37.38%	62.62%
Cyclohexane	68.20%	31.80%
Other Hexanes	30.00%	70.00%
Heptanes	57.43%	42.57%
Methylcyclohexane	75.68%	24.32%
Benzene	96.37%	3.63%
Toluene	97.93%	2.07%
Xylenes	99.37%	0.63%
C8+ Heavies	88.68%	11.32%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 10.0000 scfm

Component	Remaining in Glycol	Distilled Overhead

Water	15.66%	84.34%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.96%	99.04%
n-Pentane	0.88%	99.12%
n-Hexane	0.64%	99.36%
Cyclohexane	3.78%	96.22%
Other Hexanes	1.41%	98.59%
Heptanes	0.51%	99.49%
Methylcyclohexane	4.22%	95.78%
Benzene	5.06%	94.94%
Toluene	7.91%	92.09%
Xylenes	12.82%	87.18%
C8+ Heavies	10.52%	89.48%

STREAM REPORTS:

WET GAS STREAM

Temperature: 110.00 deg. F
Pressure: 1064.70 psia
Flow Rate: 5.01e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.58e-001	3.76e+002
Carbon Dioxide	8.99e-002	5.22e+002
Nitrogen	3.99e-001	1.48e+003
Methane	7.53e+001	1.59e+005
Ethane	1.44e+001	5.72e+004
Propane	6.02e+000	3.51e+004
Isobutane	6.09e-001	4.67e+003
n-Butane	1.70e+000	1.30e+004
Isopentane	3.50e-001	3.33e+003
n-Pentane	4.89e-001	4.66e+003
n-Hexane	1.50e-001	1.70e+003
Cyclohexane	2.00e-002	2.22e+002
Other Hexanes	1.80e-001	2.04e+003
Heptanes	8.99e-002	1.19e+003
Methylcyclohexane	2.00e-002	2.59e+002
Benzene	2.00e-003	2.06e+001
Toluene	3.00e-003	3.64e+001
Xylenes	9.99e-004	1.40e+001
C8+ Heavies	3.00e-002	6.74e+002
Total Components	100.00	2.86e+005

DRY GAS STREAM

Temperature: 110.00 deg. F
Pressure: 1064.70 psia
Flow Rate: 5.00e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	3.50e+001
Carbon Dioxide	8.99e-002	5.22e+002
Nitrogen	4.00e-001	1.48e+003
Methane	7.54e+001	1.59e+005
Ethane	1.44e+001	5.71e+004
Propane	6.03e+000	3.50e+004
Isobutane	6.10e-001	4.67e+003
n-Butane	1.70e+000	1.30e+004
Isopentane	3.50e-001	3.33e+003
n-Pentane	4.90e-001	4.66e+003
n-Hexane	1.50e-001	1.70e+003
Cyclohexane	2.00e-002	2.21e+002
Other Hexanes	1.80e-001	2.04e+003
Heptanes	8.99e-002	1.19e+003
Methylcyclohexane	2.00e-002	2.58e+002
Benzene	1.95e-003	2.01e+001
Toluene	2.91e-003	3.53e+001
Xylenes	9.51e-004	1.33e+001
C8+ Heavies	2.99e-002	6.72e+002
Total Components	100.00	2.85e+005

LEAN GLYCOL STREAM

Temperature: 110.00 deg. F
Flow Rate: 7.50e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	4.16e+003
Water	1.50e+000	6.33e+001
Carbon Dioxide	1.02e-012	4.30e-011
Nitrogen	2.71e-013	1.14e-011
Methane	8.45e-018	3.57e-016
Ethane	1.10e-007	4.63e-006
Propane	8.59e-009	3.63e-007
Isobutane	1.01e-009	4.26e-008
n-Butane	2.97e-009	1.25e-007
Isopentane	1.35e-004	5.70e-003
n-Pentane	2.38e-004	1.00e-002
n-Hexane	1.19e-004	5.01e-003
Cyclohexane	4.43e-004	1.87e-002
Other Hexanes	2.27e-004	9.58e-003
Heptanes	1.27e-004	5.38e-003

Methylcyclohexane	6.23e-004	2.63e-002
Benzene	6.27e-004	2.65e-002
Toluene	2.23e-003	9.41e-002
Xylenes	2.41e-003	1.02e-001
C8+ Heavies	4.27e-003	1.80e-001
Total Components	100.00	4.22e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 110.00 deg. F
Pressure: 1064.70 psia
Flow Rate: 8.68e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.68e+001	4.15e+003
Water	8.45e+000	4.05e+002
Carbon Dioxide	1.59e-002	7.63e-001
Nitrogen	2.21e-002	1.06e+000
Methane	2.34e+000	1.12e+002
Ethane	9.66e-001	4.63e+001
Propane	6.53e-001	3.13e+001
Isobutane	9.19e-002	4.40e+000
n-Butane	2.79e-001	1.34e+001
Isopentane	6.82e-002	3.26e+000
n-Pentane	1.04e-001	4.98e+000
n-Hexane	4.36e-002	2.09e+000
Cyclohexane	1.52e-002	7.26e-001
Other Hexanes	4.72e-002	2.26e+000
Heptanes	3.83e-002	1.83e+000
Methylcyclohexane	1.72e-002	8.23e-001
Benzene	1.13e-002	5.43e-001
Toluene	2.54e-002	1.21e+000
Xylenes	1.67e-002	7.98e-001
C8+ Heavies	4.04e-002	1.93e+000
Total Components	100.00	4.79e+003

FLASH TANK OFF GAS STREAM

Temperature: 70.00 deg. F
Pressure: 69.70 psia
Flow Rate: 3.63e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.09e-001	1.87e-001
Carbon Dioxide	1.60e-001	6.75e-001
Nitrogen	3.91e-001	1.05e+000
Methane	7.26e+001	1.12e+002
Ethane	1.57e+001	4.51e+001

Propane	6.88e+000	2.91e+001
Isobutane	7.02e-001	3.90e+000
n-Butane	2.04e+000	1.13e+001
Isopentane	3.86e-001	2.67e+000
n-Pentane	5.56e-001	3.84e+000
n-Hexane	1.58e-001	1.31e+000
Cyclohexane	2.86e-002	2.31e-001
Other Hexanes	1.92e-001	1.58e+000
Heptanes	8.13e-002	7.80e-001
Methylcyclohexane	2.13e-002	2.00e-001
Benzene	2.64e-003	1.97e-002
Toluene	2.85e-003	2.52e-002
Xylenes	4.95e-004	5.03e-003
C8+ Heavies	1.34e-002	2.19e-001
Total Components	100.00	2.14e+002

FLASH TANK GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 8.20e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.08e+001	4.15e+003
Water	8.84e+000	4.04e+002
Carbon Dioxide	1.93e-003	8.81e-002
Nitrogen	1.36e-004	6.24e-003
Methane	1.64e-002	7.49e-001
Ethane	2.53e-002	1.16e+000
Propane	4.78e-002	2.19e+000
Isobutane	1.08e-002	4.96e-001
n-Butane	4.43e-002	2.03e+000
Isopentane	1.30e-002	5.94e-001
n-Pentane	2.48e-002	1.14e+000
n-Hexane	1.71e-002	7.81e-001
Cyclohexane	1.08e-002	4.95e-001
Other Hexanes	1.48e-002	6.78e-001
Heptanes	2.30e-002	1.05e+000
Methylcyclohexane	1.36e-002	6.23e-001
Benzene	1.14e-002	5.23e-001
Toluene	2.60e-002	1.19e+000
Xylenes	1.73e-002	7.93e-001
C8+ Heavies	3.75e-002	1.71e+000
Total Components	100.00	4.57e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 7.89e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.11e+001	3.41e+002
Carbon Dioxide	1.65e-002	1.51e-001
Nitrogen	3.15e-002	1.83e-001
Methane	5.96e+000	1.99e+001
Ethane	1.28e+000	8.02e+000
Propane	6.97e-001	6.39e+000
Isobutane	8.74e-002	1.06e+000
n-Butane	2.97e-001	3.59e+000
Isopentane	6.59e-002	9.88e-001
n-Pentane	1.12e-001	1.69e+000
n-Hexane	5.47e-002	9.80e-001
Cyclohexane	2.87e-002	5.03e-001
Other Hexanes	5.10e-002	9.14e-001
Heptanes	5.71e-002	1.19e+000
Methylcyclohexane	3.07e-002	6.27e-001
Benzene	3.07e-002	4.99e-001
Toluene	5.74e-002	1.10e+000
Xylenes	3.14e-002	6.93e-001
C8+ Heavies	4.56e-002	1.61e+000
Total Components	100.00	3.91e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.40e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.70e+001	3.97e-001
Ethane	1.44e+001	1.60e-001
Propane	7.84e+000	1.28e-001
Isobutane	9.83e-001	2.11e-002
n-Butane	3.34e+000	7.17e-002
Isopentane	7.41e-001	1.98e-002
n-Pentane	1.26e+000	3.37e-002
n-Hexane	6.15e-001	1.96e-002
Cyclohexane	3.23e-001	1.01e-002
Other Hexanes	5.74e-001	1.83e-002
Heptanes	6.43e-001	2.38e-002
Methylcyclohexane	3.46e-001	1.25e-002
Benzene	3.46e-001	9.98e-003
Toluene	6.45e-001	2.20e-002

Xylenes	3.53e-001	1.39e-002
C8+ Heavies	5.13e-001	3.23e-002
---	---	---
Total Components	100.00	9.94e-001

aspentech	MARATHON PETROLEUM COMPA Bedford, MA USA	Case Name: Three Brothers CS HYSYS.hsc Unit Set: NewUser3 Date/Time: Thu Sep 06 17:18:00 2018

Material Stream: Sat. Gas

Fluid Package: Basis-1

Property Package: Peng-Robinson

CONDITIONS

	Overall	Vapour Phase
Vapour / Phase Fraction	1.0000	1.0000
Temperature: (F)	47.35	47.35
Pressure: (psia)	139.7	139.7
Molar Flow (MMSCFD)	120.1	120.1
Mass Flow (lb/hr)	2.843e+005	2.843e+005
Std Ideal Liq Vol Flow (barrel/day)	5.587e+004	5.587e+004
Molar Enthalpy (Btu/lbmole)	-3.501e+004	-3.501e+004
Molar Entropy (Btu/lbmole-F)	39.98	39.98
Heat Flow (Btu/hr)	-4.619e+008	-4.619e+008
Liq Vol Flow @Std Cond (barrel/day)	2.126e+007 *	2.126e+007

PROPERTIES

	Overall	Vapour Phase
Molecular Weight	21.55	21.55
Molar Density (lbmole/ft3)	2.690e-002	2.690e-002
Mass Density (lb/ft3)	0.5799	0.5799
Act. Volume Flow (barrel/day)	2.096e+006	2.096e+006
Mass Enthalpy (Btu/lb)	-1624	-1624
Mass Entropy (Btu/lb-F)	1.855	1.855
Heat Capacity (Btu/lbmole-F)	10.51	10.51
Mass Heat Capacity (Btu/lb-F)	0.4875	0.4875
LHV Molar Basis (Std) (Btu/lbmole)	4.464e+005	4.464e+005
HHV Molar Basis (Std) (Btu/lbmole)	4.882e+005	4.882e+005
HHV Mass Basis (Std) (Btu/lb)	2.265e+004	2.265e+004
CO2 Loading	---	---
CO2 App ML Con (lbmole/ft3)	---	---
CO2 App WT Con (lbmol/lb)	---	---
LHV Mass Basis (Std) (Btu/lb)	2.071e+004	2.071e+004
Phase Fraction [Vol. Basis]	1.000	1.000
Phase Fraction [Mass Basis]	1.000	1.000
Phase Fraction [Act. Vol. Basis]	1.000	1.000
Mass Exergy (Btu/lb)	110.1	---
Partial Pressure of CO2 (psia)	0.1256	---
Cost Based on Flow (Cost/s)	0.0000	0.0000
Act. Gas Flow (ACFM)	8172	8172
Avg. Liq. Density (lbmole/ft3)	1.009	1.009
Specific Heat (Btu/lbmole-F)	10.51	10.51
Std. Gas Flow (MMSCFD)	119.9	119.9
Std. Ideal Liq. Mass Density (lb/ft3)	21.75	21.75
Act. Liq. Flow (USGPM)	---	---
Z Factor	0.9543	0.9543
Watson K	18.03	18.03
User Property	---	---
Partial Pressure of H2S (psia)	0.0000	---
Cp/(Cp - R)	1.233	1.233
Cp/Cv	1.293	1.293
Heat of Vap. (Btu/lbmole)	6366	---
Kinematic Viscosity (cSt)	1.140	1.140
Liq. Mass Density (Std. Cond) (lb/ft3)	5.716e-002	5.716e-002
Liq. Vol. Flow (Std. Cond) (barrel/day)	2.126e+007	2.126e+007
Liquid Fraction	0.0000	0.0000
Molar Volume (ft3/lbmole)	37.17	37.17
Mass Heat of Vap. (Btu/lb)	295.4	---

Licensed to: MARATHON PETROLEUM COMPA

* Specified by user.

Material Stream: Sat. Gas (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

PROPERTIES

		Overall	Vapour Phase			
Phase Fraction [Molar Basis]		1.0000	1.0000			
Surface Tension	(dyne/cm)	---	---			
Thermal Conductivity	(Btu/hr-ft-F)	1.619e-002	1.619e-002			
Viscosity	(cP)	1.059e-002	1.059e-002			
Cv (Semi-Ideal)	(Btu/lbmole-F)	8.522	8.522			
Mass Cv (Semi-Ideal)	(Btu/lb-F)	0.3954	0.3954			
Cv	(Btu/lbmole-F)	8.128	8.128			
Mass Cv	(Btu/lb-F)	0.3771	0.3771			
Cv (Ent. Method)	(Btu/lbmole-F)	---	---			
Mass Cv (Ent. Method)	(Btu/lb-F)	---	---			
Cp/Cv (Ent. Method)		---	---			
Reid VP at 37.8 C	(psia)	---	---			
True VP at 37.8 C	(psia)	---	---			
Liq. Vol. Flow - Sum(Std. Cond)	(barrel/day)	2.126e+007	2.126e+007			
Viscosity Index		-24.00	---			
Ideal Gas Cp/Cv		1.246	1.246			
Ideal Gas Cp	(Btu/lbmole-F)	10.07	10.07			
Mass Ideal Gas Cp	(Btu/lb-F)	0.4671	0.4671			
Bubble Point Pressure	(psia)	2170	---			

COMPOSITION

Overall Phase

Vapour Fraction 1.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	56.6706	0.0043	1587.5123	0.0056	134.8028	0.0024
CO2	11.8613	0.0009	522.0113	0.0018	43.3080	0.0008
Methane	9938.4340	0.7534	159441.3038	0.5607	36464.9818	0.6527
Ethane	1918.8914	0.1455	57700.8730	0.2029	11108.0425	0.1988
Propane	797.3415	0.0604	35160.3701	0.1237	4751.5976	0.0850
i-Butane	75.1214	0.0057	4366.3583	0.0154	532.0196	0.0095
n-Butane	218.7747	0.0166	12716.0610	0.0447	1492.9189	0.0267
i-Pentane	40.8555	0.0031	2947.7665	0.0104	323.7541	0.0058
n-Pentane	60.6243	0.0046	4374.1051	0.0154	475.6131	0.0085
22-Mbutane	1.3179	0.0001	113.5756	0.0004	11.9173	0.0002
2-Mpentane	10.5434	0.0008	908.6046	0.0032	94.7663	0.0017
3-Mpentane	7.9075	0.0006	681.4534	0.0024	69.8849	0.0013
n-Hexane	17.1330	0.0013	1476.4824	0.0052	152.5644	0.0027
Mcyclopentan	2.6358	0.0002	221.8373	0.0008	20.1975	0.0004
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	1.3179	0.0001	110.9161	0.0004	9.7142	0.0002
2-Mhexane	2.6358	0.0002	264.1243	0.0009	26.5360	0.0005
3-Mhexane	2.6358	0.0002	264.1243	0.0009	26.2030	0.0005
1-ci2-MCC5	1.3179	0.0001	129.4052	0.0005	11.4198	0.0002
n-Heptane	3.9538	0.0003	396.1865	0.0014	39.4983	0.0007
Mcyclohexane	2.6358	0.0002	258.8105	0.0009	22.9426	0.0004
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	1.3179	0.0001	121.4342	0.0004	9.5569	0.0002
2-Mheptane	1.3179	0.0001	150.5486	0.0005	14.7092	0.0003
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	1.3179	0.0001	150.5486	0.0005	14.6142	0.0003

* Specified by user.

Material Stream: Sat. Gas (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Overall Phase (continued)

Vapour Fraction 1.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	15.5089	0.0012	279.3944	0.0010	19.1695	0.0003
Total	13192.0721	1.0000	284343.8077	1.0000	55870.7325	1.0000

Vapour Phase

Phase Fraction 1.000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	56.6706	0.0043	1587.5123	0.0056	134.8028	0.0024
CO2	11.8613	0.0009	522.0113	0.0018	43.3080	0.0008
Methane	9938.4340	0.7534	159441.3038	0.5607	36464.9818	0.6527
Ethane	1918.8914	0.1455	57700.8730	0.2029	11108.0425	0.1988
Propane	797.3415	0.0604	35160.3701	0.1237	4751.5976	0.0850
i-Butane	75.1214	0.0057	4366.3583	0.0154	532.0196	0.0095
n-Butane	218.7747	0.0166	12716.0610	0.0447	1492.9189	0.0267
i-Pentane	40.8555	0.0031	2947.7665	0.0104	323.7541	0.0058
n-Pentane	60.6243	0.0046	4374.1051	0.0154	475.6131	0.0085
22-Mbutane	1.3179	0.0001	113.5756	0.0004	11.9173	0.0002
2-Mpentane	10.5434	0.0008	908.6046	0.0032	94.7663	0.0017
3-Mpentane	7.9075	0.0006	681.4534	0.0024	69.8849	0.0013
n-Hexane	17.1330	0.0013	1476.4824	0.0052	152.5644	0.0027
Mcyclopentan	2.6358	0.0002	221.8373	0.0008	20.1975	0.0004
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	1.3179	0.0001	110.9161	0.0004	9.7142	0.0002
2-Mhexane	2.6358	0.0002	264.1243	0.0009	26.5360	0.0005
3-Mhexane	2.6358	0.0002	264.1243	0.0009	26.2030	0.0005
1-ci2-MCC5	1.3179	0.0001	129.4052	0.0005	11.4198	0.0002
n-Heptane	3.9538	0.0003	396.1865	0.0014	39.4983	0.0007
Mcyclohexane	2.6358	0.0002	258.8105	0.0009	22.9426	0.0004
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	1.3179	0.0001	121.4342	0.0004	9.5569	0.0002
2-Mheptane	1.3179	0.0001	150.5486	0.0005	14.7092	0.0003
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	1.3179	0.0001	150.5486	0.0005	14.6142	0.0003
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	15.5089	0.0012	279.3944	0.0010	19.1695	0.0003
Total	13192.0721	1.0000	284343.8077	1.0000	55870.7325	1.0000

* Specified by user.

Material Stream: FLASH

Fluid Package: Basis-1
Property Package: Peng-Robinson

CONDITIONS

	Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Vapour / Phase Fraction	1.0000	1.0000	0.0000	0.0000
Temperature: (F)	67.67 *	67.67	67.67	67.67
Pressure: (psia)	14.70	14.70	14.70	14.70
Molar Flow (MMSCFD)	7.653e-003	7.653e-003	0.0000	0.0000
Mass Flow (lb/hr)	36.98	36.98	0.0000	0.0000
Std Ideal Liq Vol Flow (barrel/day)	5.010	5.010	0.0000	0.0000
Molar Enthalpy (Btu/lbmole)	-4.792e+004	-4.792e+004	-8.289e+004	-1.232e+005
Molar Entropy (Btu/lbmole-F)	42.46	42.46	13.74	12.50
Heat Flow (Btu/hr)	-4.027e+004	-4.027e+004	0.0000	0.0000
Liq Vol Flow @Std Cond (barrel/day)	4.962 *	4.962	0.0000	0.0000

PROPERTIES

	Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Molecular Weight	44.00	44.00	88.74	18.02
Molar Density (lbmole/ft3)	2.642e-003	2.642e-003	0.4794	3.504
Mass Density (lb/ft3)	0.1162	0.1162	42.54	63.13
Act. Volume Flow (barrel/day)	1360	1360	0.0000	0.0000
Mass Enthalpy (Btu/lb)	-1089	-1089	-934.0	-6840
Mass Entropy (Btu/lb-F)	0.9650	0.9650	0.1549	0.6939
Heat Capacity (Btu/lbmole-F)	17.96	17.96	43.87	18.56
Mass Heat Capacity (Btu/lb-F)	0.4081	0.4081	0.4943	1.030
LHV Molar Basis (Std) (Btu/lbmole)	8.657e+005	8.657e+005	1.707e+006	2.534e-004
HHV Molar Basis (Std) (Btu/lbmole)	9.353e+005	9.353e+005	1.829e+006	1.763e+004
HHV Mass Basis (Std) (Btu/lb)	2.126e+004	2.126e+004	2.062e+004	978.7
CO2 Loading	---	---	---	---
CO2 App ML Con (lbmole/ft3)	---	---	---	---
CO2 App WT Con (lbmol/lb)	---	---	---	---
LHV Mass Basis (Std) (Btu/lb)	1.967e+004	1.967e+004	1.923e+004	1.406e-005
Phase Fraction [Vol. Basis]	1.000	1.000	---	---
Phase Fraction [Mass Basis]	1.000	1.000	0.0000	0.0000
Phase Fraction [Act. Vol. Basis]	1.000	1.000	0.0000	0.0000
Mass Exergy (Btu/lb)	3.372e-002	---	---	---
Partial Pressure of CO2 (psia)	9.647e-003	---	---	---
Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000
Act. Gas Flow (ACFM)	5.302	5.302	---	---
Avg. Liq. Density (lbmole/ft3)	0.7170	0.7170	0.4781	3.458
Specific Heat (Btu/lbmole-F)	17.96	17.96	43.87	18.56
Std. Gas Flow (MMSCFD)	7.638e-003	7.638e-003	0.0000	0.0000
Std. Ideal Liq. Mass Density (lb/ft3)	31.55	31.55	42.42	62.30
Act. Liq. Flow (USGPM)	0.0000	---	---	0.0000
Z Factor	---	0.9830	5.417e-003	7.411e-004
Watson K	14.72	14.72	12.54	8.515
User Property	---	---	---	---
Partial Pressure of H2S (psia)	0.0000	---	---	---
Cp/(Cp - R)	1.124	1.124	1.047	1.120
Cp/Cv	1.133	1.133	1.047	1.144
Heat of Vap. (Btu/lbmole)	1.353e+004	---	---	---
Kinematic Viscosity (cSt)	4.562	4.562	0.5356	0.9951
Liq. Mass Density (Std. Cond) (lb/ft3)	31.85	31.85	42.82	63.35
Liq. Vol. Flow (Std. Cond) (barrel/day)	4.962	4.962	0.0000	0.0000
Liquid Fraction	0.0000	0.0000	1.000	1.000
Molar Volume (ft3/lbmole)	378.5	378.5	2.086	0.2854
Mass Heat of Vap. (Btu/lb)	307.4	---	---	---

* Specified by user.

Material Stream: FLASH (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

PROPERTIES

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Phase Fraction [Molar Basis]		1.0000	1.0000	0.0000	0.0000
Surface Tension	(dyne/cm)	---	---	18.63	72.99
Thermal Conductivity	(Btu/hr-ft-F)	1.075e-002	1.075e-002	6.665e-002	0.3485
Viscosity	(cP)	8.494e-003	8.494e-003	0.3650	1.006
Cv (Semi-Ideal)	(Btu/lbmole-F)	15.97	15.97	41.88	16.58
Mass Cv (Semi-Ideal)	(Btu/lb-F)	0.3630	0.3630	0.4719	0.9202
Cv	(Btu/lbmole-F)	15.85	15.85	41.88	16.23
Mass Cv	(Btu/lb-F)	0.3602	0.3602	0.4719	0.9011
Cv (Ent. Method)	(Btu/lbmole-F)	---	---	---	15.91
Mass Cv (Ent. Method)	(Btu/lb-F)	---	---	---	0.8834
Cp/Cv (Ent. Method)		---	---	---	1.166
Reid VP at 37.8 C	(psia)	355.6	355.6	16.14	0.9558
True VP at 37.8 C	(psia)	721.8	721.8	21.91	0.9558
Liq. Vol. Flow - Sum(Std. Cond)	(barrel/day)	4.962	4.962	0.0000	0.0000
Viscosity Index		-46.67	---	---	---
Ideal Gas Cp/Cv		1.125	1.125	1.063	1.329
Ideal Gas Cp	(Btu/lbmole-F)	17.82	17.82	33.35	8.013
Mass Ideal Gas Cp	(Btu/lb-F)	0.4050	0.4050	0.3758	0.4448
Bubble Point Pressure	(psia)	616.8	---	---	---

COMPOSITION

Overall Phase

Vapour Fraction 1.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0003	0.0003	0.0073	0.0002	0.0006	0.0001
CO2	0.0006	0.0007	0.0243	0.0007	0.0020	0.0004
Methane	0.1509	0.1795	2.4201	0.0654	0.5535	0.1105
Ethane	0.1668	0.1985	5.0166	0.1357	0.9657	0.1928
Propane	0.2108	0.2508	9.2939	0.2513	1.2560	0.2507
i-Butane	0.0358	0.0426	2.0803	0.0563	0.2535	0.0506
n-Butane	0.1234	0.1468	7.1702	0.1939	0.8418	0.1680
i-Pentane	0.0304	0.0362	2.1965	0.0594	0.2412	0.0482
n-Pentane	0.0483	0.0575	3.4863	0.0943	0.3791	0.0757
22-Mbutane	0.0011	0.0014	0.0981	0.0027	0.0103	0.0021
2-Mpentane	0.0093	0.0111	0.8051	0.0218	0.0840	0.0168
3-Mpentane	0.0071	0.0085	0.6121	0.0166	0.0628	0.0125
n-Hexane	0.0158	0.0188	1.3594	0.0368	0.1405	0.0280
Mcyclopentan	0.0024	0.0029	0.2055	0.0056	0.0187	0.0037
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0012	0.0015	0.1035	0.0028	0.0091	0.0018
2-Mhexane	0.0026	0.0031	0.2598	0.0070	0.0261	0.0052
3-Mhexane	0.0026	0.0031	0.2606	0.0070	0.0259	0.0052
1-ci2-MCC5	0.0013	0.0016	0.1301	0.0035	0.0115	0.0023
n-Heptane	0.0040	0.0048	0.4008	0.0108	0.0400	0.0080
Mcyclohexane	0.0026	0.0031	0.2550	0.0069	0.0226	0.0045
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0013	0.0016	0.1241	0.0034	0.0098	0.0019
2-Mheptane	0.0014	0.0017	0.1622	0.0044	0.0158	0.0032
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0015	0.0018	0.1680	0.0045	0.0163	0.0033

* Specified by user.

Material Stream: FLASH (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Overall Phase (continued)

Vapour Fraction 1.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0188	0.0223	0.3379	0.0091	0.0232	0.0046
Total	0.8403	1.0000	36.9776	1.0000	5.0098	1.0000

Vapour Phase

Phase Fraction 1.000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0003	0.0003	0.0073	0.0002	0.0006	0.0001
CO2	0.0006	0.0007	0.0243	0.0007	0.0020	0.0004
Methane	0.1509	0.1795	2.4201	0.0654	0.5535	0.1105
Ethane	0.1668	0.1985	5.0166	0.1357	0.9657	0.1928
Propane	0.2108	0.2508	9.2939	0.2513	1.2560	0.2507
i-Butane	0.0358	0.0426	2.0803	0.0563	0.2535	0.0506
n-Butane	0.1234	0.1468	7.1702	0.1939	0.8418	0.1680
i-Pentane	0.0304	0.0362	2.1965	0.0594	0.2412	0.0482
n-Pentane	0.0483	0.0575	3.4863	0.0943	0.3791	0.0757
22-Mbutane	0.0011	0.0014	0.0981	0.0027	0.0103	0.0021
2-Mpentane	0.0093	0.0111	0.8051	0.0218	0.0840	0.0168
3-Mpentane	0.0071	0.0085	0.6121	0.0166	0.0628	0.0125
n-Hexane	0.0158	0.0188	1.3594	0.0368	0.1405	0.0280
Mcyclopentan	0.0024	0.0029	0.2055	0.0056	0.0187	0.0037
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0012	0.0015	0.1035	0.0028	0.0091	0.0018
2-Mhexane	0.0026	0.0031	0.2598	0.0070	0.0261	0.0052
3-Mhexane	0.0026	0.0031	0.2606	0.0070	0.0259	0.0052
1-ci2-MCC5	0.0013	0.0016	0.1301	0.0035	0.0115	0.0023
n-Heptane	0.0040	0.0048	0.4008	0.0108	0.0400	0.0080
Mcyclohexane	0.0026	0.0031	0.2550	0.0069	0.0226	0.0045
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0013	0.0016	0.1241	0.0034	0.0098	0.0019
2-Mheptane	0.0014	0.0017	0.1622	0.0044	0.0158	0.0032
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0015	0.0018	0.1680	0.0045	0.0163	0.0033
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0188	0.0223	0.3379	0.0091	0.0232	0.0046
Total	0.8403	1.0000	36.9776	1.0000	5.0098	1.0000

* Specified by user.

Material Stream: FLASH (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Liquid Phase

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	0.0000	0.0010	0.0000	0.0002	0.0000	0.0004
Ethane	0.0000	0.0066	0.0000	0.0022	0.0000	0.0043
Propane	0.0000	0.0321	0.0000	0.0160	0.0000	0.0214
i-Butane	0.0000	0.0146	0.0000	0.0096	0.0000	0.0116
n-Butane	0.0000	0.0727	0.0000	0.0476	0.0000	0.0555
i-Pentane	0.0000	0.0470	0.0000	0.0382	0.0000	0.0417
n-Pentane	0.0000	0.1017	0.0000	0.0827	0.0000	0.0892
22-Mbutane	0.0000	0.0042	0.0000	0.0041	0.0000	0.0043
2-Mpentane	0.0000	0.0473	0.0000	0.0459	0.0000	0.0475
3-Mpentane	0.0000	0.0407	0.0000	0.0395	0.0000	0.0402
n-Hexane	0.0000	0.1135	0.0000	0.1102	0.0000	0.1130
Mcyclopentan	0.0000	0.0184	0.0000	0.0174	0.0000	0.0158
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0000	0.0116	0.0000	0.0110	0.0000	0.0096
2-Mhexane	0.0000	0.0442	0.0000	0.0499	0.0000	0.0497
3-Mhexane	0.0000	0.0462	0.0000	0.0522	0.0000	0.0514
1-ci2-MCC5	0.0000	0.0287	0.0000	0.0318	0.0000	0.0278
n-Heptane	0.0000	0.0932	0.0000	0.1053	0.0000	0.1042
Mcyclohexane	0.0000	0.0542	0.0000	0.0600	0.0000	0.0528
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	0.0369	0.0000	0.0383	0.0000	0.0299
2-Mheptane	0.0000	0.0744	0.0000	0.0957	0.0000	0.0928
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0000	0.1104	0.0000	0.1422	0.0000	0.1370
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0000	0.0004	0.0000	0.0001	0.0000	0.0001
Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000

Aqueous Phase

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

* Specified by user.

Material Stream: FLASH (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Aqueous Phase (continued)

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000

Material Stream: NGL

Fluid Package: Basis-1
Property Package: Peng-Robinson

CONDITIONS

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Vapour / Phase Fraction		0.0000	0.0000	1.0000	0.0000
Temperature:	(F)	67.67	67.67	67.67	67.67
Pressure:	(psia)	14.70	14.70	14.70	14.70
Molar Flow	(MMSCFD)	2.486e-002	0.0000	2.486e-002	0.0000
Mass Flow	(lb/hr)	242.3	0.0000	242.3	0.0000
Std Ideal Liq Vol Flow	(barrel/day)	24.41	0.0000	24.41	0.0000
Molar Enthalpy	(Btu/lbmole)	-8.289e+004	-4.792e+004	-8.289e+004	-1.232e+005
Molar Entropy	(Btu/lbmole-F)	13.74	42.46	13.74	12.50
Heat Flow	(Btu/hr)	-2.263e+005	0.0000	-2.263e+005	0.0000
Liq Vol Flow @Std Cond	(barrel/day)	24.19 *	0.0000	24.19	0.0000

PROPERTIES

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Molecular Weight		88.74	44.00	88.74	18.02
Molar Density	(lbmole/ft3)	0.4794	2.642e-003	0.4794	3.504
Mass Density	(lb/ft3)	42.54	0.1162	42.54	63.13
Act. Volume Flow	(barrel/day)	24.34	0.0000	24.34	0.0000
Mass Enthalpy	(Btu/lb)	-934.0	-1089	-934.0	-6840

* Specified by user.

Material Stream: NGL (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

PROPERTIES

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Mass Entropy	(Btu/lb-F)	0.1549	0.9650	0.1549	0.6939
Heat Capacity	(Btu/lbmole-F)	43.87	17.96	43.87	18.56
Mass Heat Capacity	(Btu/lb-F)	0.4943	0.4081	0.4943	1.030
LHV Molar Basis (Std)	(Btu/lbmole)	1.707e+006	8.657e+005	1.707e+006	2.534e-004
HHV Molar Basis (Std)	(Btu/lbmole)	1.829e+006	9.353e+005	1.829e+006	1.763e+004
HHV Mass Basis (Std)	(Btu/lb)	2.062e+004	2.126e+004	2.062e+004	978.7
CO2 Loading		---	---	---	---
CO2 App ML Con	(lbmole/ft3)	4.758e-006	---	4.758e-006	---
CO2 App WT Con	(lbmol/lb)	1.119e-007	---	1.119e-007	---
LHV Mass Basis (Std)	(Btu/lb)	1.923e+004	1.967e+004	1.923e+004	1.406e-005
Phase Fraction [Vol. Basis]		---	---	1.000	---
Phase Fraction [Mass Basis]		0.0000	0.0000	1.000	0.0000
Phase Fraction [Act. Vol. Basis]		0.0000	0.0000	1.000	0.0000
Mass Exergy	(Btu/lb)	4.339e-002	---	---	---
Partial Pressure of CO2	(psia)	0.0000	---	---	---
Cost Based on Flow	(Cost/s)	0.0000	0.0000	0.0000	0.0000
Act. Gas Flow	(ACFM)	---	---	---	---
Avg. Liq. Density	(lbmole/ft3)	0.4781	0.7170	0.4781	3.458
Specific Heat	(Btu/lbmole-F)	43.87	17.96	43.87	18.56
Std. Gas Flow	(MMSCFD)	2.482e-002	0.0000	2.482e-002	0.0000
Std. Ideal Liq. Mass Density	(lb/ft3)	42.42	31.55	42.42	62.30
Act. Liq. Flow	(USGPM)	0.7100	---	0.7100	0.0000
Z Factor		---	0.9830	5.417e-003	7.411e-004
Watson K		12.54	14.72	12.54	8.515
User Property		---	---	---	---
Partial Pressure of H2S	(psia)	0.0000	---	---	---
Cp/(Cp - R)		1.047	1.124	1.047	1.120
Cp/Cv		1.047	1.133	1.047	1.144
Heat of Vap.	(Btu/lbmole)	1.833e+004	---	---	---
Kinematic Viscosity	(cSt)	0.5356	4.562	0.5356	0.9951
Liq. Mass Density (Std. Cond)	(lb/ft3)	42.82	31.85	42.82	63.35
Liq. Vol. Flow (Std. Cond)	(barrel/day)	24.19	0.0000	24.19	0.0000
Liquid Fraction		1.000	0.0000	1.000	1.000
Molar Volume	(ft3/lbmole)	2.086	378.5	2.086	0.2854
Mass Heat of Vap.	(Btu/lb)	206.5	---	---	---
Phase Fraction [Molar Basis]		0.0000	0.0000	1.0000	0.0000
Surface Tension	(dyne/cm)	18.63	---	18.63	72.99
Thermal Conductivity	(Btu/hr-ft-F)	6.665e-002	1.075e-002	6.665e-002	0.3485
Viscosity	(cP)	0.3650	8.494e-003	0.3650	1.006
Cv (Semi-Ideal)	(Btu/lbmole-F)	41.88	15.97	41.88	16.58
Mass Cv (Semi-Ideal)	(Btu/lb-F)	0.4719	0.3630	0.4719	0.9202
Cv	(Btu/lbmole-F)	41.88	15.85	41.88	16.23
Mass Cv	(Btu/lb-F)	0.4719	0.3602	0.4719	0.9011
Cv (Ent. Method)	(Btu/lbmole-F)	---	---	---	15.91
Mass Cv (Ent. Method)	(Btu/lb-F)	---	---	---	0.8834
Cp/Cv (Ent. Method)		---	---	---	1.166
Reid VP at 37.8 C	(psia)	16.14	355.6	16.14	0.9558
True VP at 37.8 C	(psia)	21.91	721.8	21.91	0.9558
Liq. Vol. Flow - Sum(Std. Cond)	(barrel/day)	24.19	0.0000	24.19	0.0000
Viscosity Index		-7.048	---	---	---
Ideal Gas Cp/Cv		1.063	1.125	1.063	1.329
Ideal Gas Cp	(Btu/lbmole-F)	33.35	17.82	33.35	8.013
Mass Ideal Gas Cp	(Btu/lb-F)	0.3758	0.4050	0.3758	0.4448

* Specified by user.

Material Stream: NGL (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

PROPERTIES

	Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Bubble Point Pressure (psia)	14.70	---	---	---

COMPOSITION

Overall Phase

Vapour Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0012	0.0000	0.0001	0.0000
Methane	0.0027	0.0010	0.0428	0.0002	0.0098	0.0004
Ethane	0.0181	0.0066	0.5447	0.0022	0.1049	0.0043
Propane	0.0877	0.0321	3.8657	0.0160	0.5224	0.0214
i-Butane	0.0398	0.0146	2.3161	0.0096	0.2822	0.0116
n-Butane	0.1985	0.0727	11.5361	0.0476	1.3544	0.0555
i-Pentane	0.1283	0.0470	9.2582	0.0382	1.0168	0.0417
n-Pentane	0.2775	0.1017	20.0234	0.0827	2.1772	0.0892
22-Mbutane	0.0116	0.0042	0.9963	0.0041	0.1045	0.0043
2-Mpentane	0.1291	0.0473	11.1270	0.0459	1.1605	0.0475
3-Mpentane	0.1110	0.0407	9.5682	0.0395	0.9812	0.0402
n-Hexane	0.3098	0.1135	26.6950	0.1102	2.7584	0.1130
Mcyclopentan	0.0502	0.0184	4.2231	0.0174	0.3845	0.0158
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0318	0.0116	2.6745	0.0110	0.2342	0.0096
2-Mhexane	0.1206	0.0442	12.0861	0.0499	1.2143	0.0497
3-Mhexane	0.1262	0.0462	12.6454	0.0522	1.2545	0.0514
1-ci2-MCC5	0.0784	0.0287	7.7004	0.0318	0.6796	0.0278
n-Heptane	0.2545	0.0932	25.5052	0.1053	2.5428	0.1042
Mcyclohexane	0.1481	0.0542	14.5373	0.0600	1.2887	0.0528
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.1006	0.0369	9.2723	0.0383	0.7297	0.0299
2-Mheptane	0.2030	0.0744	23.1882	0.0957	2.2656	0.0928
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.3015	0.1104	34.4420	0.1422	3.3434	0.1370
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0010	0.0004	0.0180	0.0001	0.0012	0.0001
Total	2.7300	1.0000	242.2673	1.0000	24.4110	1.0000

Vapour Phase

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0003	0.0000	0.0002	0.0000	0.0001
CO2	0.0000	0.0007	0.0000	0.0007	0.0000	0.0004
Methane	0.0000	0.1795	0.0000	0.0654	0.0000	0.1105
Ethane	0.0000	0.1985	0.0000	0.1357	0.0000	0.1928
Propane	0.0000	0.2508	0.0000	0.2513	0.0000	0.2507

* Specified by user.

Material Stream: NGL (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Vapour Phase (continued)

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
i-Butane	0.0000	0.0426	0.0000	0.0563	0.0000	0.0506
n-Butane	0.0000	0.1468	0.0000	0.1939	0.0000	0.1680
i-Pentane	0.0000	0.0362	0.0000	0.0594	0.0000	0.0482
n-Pentane	0.0000	0.0575	0.0000	0.0943	0.0000	0.0757
22-Mbutane	0.0000	0.0014	0.0000	0.0027	0.0000	0.0021
2-Mpentane	0.0000	0.0111	0.0000	0.0218	0.0000	0.0168
3-Mpentane	0.0000	0.0085	0.0000	0.0166	0.0000	0.0125
n-Hexane	0.0000	0.0188	0.0000	0.0368	0.0000	0.0280
Mcyclopentan	0.0000	0.0029	0.0000	0.0056	0.0000	0.0037
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0000	0.0015	0.0000	0.0028	0.0000	0.0018
2-Mhexane	0.0000	0.0031	0.0000	0.0070	0.0000	0.0052
3-Mhexane	0.0000	0.0031	0.0000	0.0070	0.0000	0.0052
1-ci2-MCC5	0.0000	0.0016	0.0000	0.0035	0.0000	0.0023
n-Heptane	0.0000	0.0048	0.0000	0.0108	0.0000	0.0080
Mcyclohexane	0.0000	0.0031	0.0000	0.0069	0.0000	0.0045
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	0.0016	0.0000	0.0034	0.0000	0.0019
2-Mheptane	0.0000	0.0017	0.0000	0.0044	0.0000	0.0032
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0000	0.0018	0.0000	0.0045	0.0000	0.0033
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0000	0.0223	0.0000	0.0091	0.0000	0.0046
Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000

Liquid Phase

Phase Fraction 1.000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0012	0.0000	0.0001	0.0000
Methane	0.0027	0.0010	0.0428	0.0002	0.0098	0.0004
Ethane	0.0181	0.0066	0.5447	0.0022	0.1049	0.0043
Propane	0.0877	0.0321	3.8657	0.0160	0.5224	0.0214
i-Butane	0.0398	0.0146	2.3161	0.0096	0.2822	0.0116
n-Butane	0.1985	0.0727	11.5361	0.0476	1.3544	0.0555
i-Pentane	0.1283	0.0470	9.2582	0.0382	1.0168	0.0417
n-Pentane	0.2775	0.1017	20.0234	0.0827	2.1772	0.0892
22-Mbutane	0.0116	0.0042	0.9963	0.0041	0.1045	0.0043
2-Mpentane	0.1291	0.0473	11.1270	0.0459	1.1605	0.0475
3-Mpentane	0.1110	0.0407	9.5682	0.0395	0.9812	0.0402
n-Hexane	0.3098	0.1135	26.6950	0.1102	2.7584	0.1130
Mcyclopentan	0.0502	0.0184	4.2231	0.0174	0.3845	0.0158
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

* Specified by user.

Material Stream: NGL (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Liquid Phase (continued)

Phase Fraction 1.000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Cyclohexane	0.0318	0.0116	2.6745	0.0110	0.2342	0.0096
2-Mhexane	0.1206	0.0442	12.0861	0.0499	1.2143	0.0497
3-Mhexane	0.1262	0.0462	12.6454	0.0522	1.2545	0.0514
1-ci2-MCC5	0.0784	0.0287	7.7004	0.0318	0.6796	0.0278
n-Heptane	0.2545	0.0932	25.5052	0.1053	2.5428	0.1042
Mcyclohexane	0.1481	0.0542	14.5373	0.0600	1.2887	0.0528
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.1006	0.0369	9.2723	0.0383	0.7297	0.0299
2-Mheptane	0.2030	0.0744	23.1882	0.0957	2.2656	0.0928
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.3015	0.1104	34.4420	0.1422	3.3434	0.1370
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0010	0.0004	0.0180	0.0001	0.0012	0.0001
Total	2.7300	1.0000	242.2673	1.0000	24.4110	1.0000

Aqueous Phase

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-ci2-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1ci2ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Mheptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

* Specified by user.

Material Stream: NGL (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Aqueous Phase (continued)

Phase Fraction 0.0000

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
1-ci2-MCC6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclononane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
334-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000

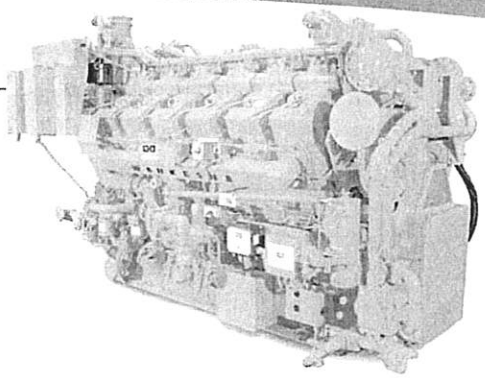
* Specified by user.

DRESSER Waukesha

L7042GSI

VHP® Series Gas Engine Extender Series®
987 - 1480 BHP (736 - 1104 kWb)

Specifications



Cylinders: V12
Piston Displacement: 7040 cu. in. (115 L)
Bore & Stroke: 9.375" x 8.5" (238 x 216 mm)
Compression Ratio: 8:1
Jacket Water System Capacity: 100 gal. (379 L)
Lube Oil Capacity: 190 gal. (719 L)
Starting System: 125 - 150 psi air/gas 24V electric
Dry Weight: 21,000 lb. (9525 kg)

Standard Equipment

AIR CLEANER – Two, 3" dry type filter with hinged rain shield and service indicator.

AIR FUEL RATIO CONTROL (AFR) – Integrated ESM® - AFR catalyst rich-burn control, main fuel gas regulator actuators, exhaust O2 sensor(s), and post turbocharger exhaust thermocouple. Factory mounted and tested. AFR maintains emissions through load and speed changes. The ESM AFR meets Canadian Standards Association Class 1, Division 2, Group A, B, C & D (Canada & US) hazardous location requirements. Note: For dual fuel applications, ESM AFR system will control the primary fuel source only.

BARRING DEVICE – Manual.

BATTERY BOX – Ship loose battery box designed to accommodate two Series 31 12 VDC batteries. Includes power disconnect switch and 20 foot (6.1 m) cable for connection to ESM® Power Distribution Box.

BEARINGS – Heavy duty, replaceable, precision type.

BREATHER – Self regulating, closed system.

CONNECTING RODS – Drop forged steel, rifle drilled.

CONTROL SYSTEM – Waukesha Engine System Manager (ESM®) integrates spark timing control, speed governing, detonation detection, start-stop control, diagnostic tools, fault logging and engine safeties. Engine Control Unit (ECU) is central brain of the control system and main customer interface. Interface with ESM is through 25 foot (7.6 m) harness to local panel, through MODBUS RTU slave connection RS-485 multidrop hardware, and through the Electronic Service Program (ESP). Customer connections are only required to the local panel, fuel valve, and 24V DC power supply. Compatible with Woodward load sharing module. ESM meets Canadian Standards Association Class I, Division 2, Group A, B, C & D (Canada & US) hazardous location requirements.

CRANKCASE – Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT – Counterweighted, forged steel, seven main bearings, and dynamically balanced.

CYLINDERS – Removable wet type bainitic cast iron cylinder liners, chrome plated on outer diameter.

CYLINDER HEADS – Twelve interchangeable. Two hard faced intake and two hard faced exhaust valves per cylinder. Hard faced intake and exhaust valve seat inserts. Roller valve lifters and hydraulic push rods.

ELECTRONIC SERVICE PROGRAM (ESP) – Microsoft® Windows-based program provided on CD-ROM for programming and interface to ESM. Includes E-Help for troubleshooting any ESM faults. Serial harness is provided for connection of a customer supplied laptop to the ECU RS-232 port.

ENGINE MONITORING DEVICES – Factory mounted and wired sensors for lube oil pressure and temperature; intake manifold temperature and pressure; overspeed; and jacket water temperature; all accessible through ESM®. ESM continually monitors combustion performance through accelerometers to provide detonation protection. Dual magnetic pick-ups are used for accurate engine speed monitoring. ESM provides predictive spark plug diagnostics as well as advanced diagnostics of engine and all ESM sensors and logs any faults into non-volatile flash memory. Sensors meet Canadian Standards Association Class 1, Division 2, Group A, B, C, & D (Canada & US) hazardous location requirements.

ENGINE ROTATION – Counterclockwise when facing flywheel.

EXHAUST OUTLET – Single vertical at rear. Flexible stainless steel connection with 8" (203 mm) pipe flange.

FLYWHEEL – Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88" (810 mm) pilot bore, 30.25" (768 mm) bolt circle, (12) 0.75"–10 tapped holes; or 28.88" (734 mm) pilot bore, 27.25" (692 mm) bolt circle, (12) 0.625"–11 tapped holes and (12) 0.75"–10 tapped holes.

FLYWHEEL HOUSING – No. 00 SAE.

FUEL SYSTEM – Single 3" ANSI flange fuel inlet connection. Two natural gas, 4" (102 mm) updraft carburetors and two mounted Fisher 99, 2" (51 mm) gas regulators, 30 – 60 psi (207 – 414 kPa) fuel inlet pressure required. 10 foot (3 m) harness provided for ESM control of customer supplied fuel shutoff valve.

GOVERNOR – Electric throttle actuator controlled by ESM with throttle position feedback. Governor tuning is performed using ESP. ESM includes option of a load-coming feature to improve engine response to step loads.

IGNITION – Ignition Power Module (IPM) controlled by ESM, with spark timing. Dual voltage energy levels automatically controlled by ESM to maximize spark plug life.

INTERCOOLER – Air–to–water.

LEVELING BOLTS

LIFTING EYES – Requires 9.5 ton Working Load Limit (W.L.L.) anchor shackles.

LUBRICATION – Full pressure, gear type pump. Engine mounted full flow lube oil micro-fiberglass filters with mounted differential pressure gauge. MICROSPIN® bypass filter, engine mounted. Air/gas motor driven prelube pump, requires final piping.

MANIFOLDS – Exhaust, (2) water cooled.

OIL COOLER – Shell and tube type, with thermostatic temperature controller and pressure regulating valve. Factory mounted.

OIL PAN – Deep sump type. 190 gallon (719 L) capacity including filter and cooler.

PAINT – Oilfield orange primer.

PISTONS – Aluminum with floating pin. Oil cooled.

SHIPPING SKID – For domestic truck or rail.

TURBOCHARGERS – Two dry type. Wastegate controlled.

VIBRATION DAMPER – Viscous type. Guard included with remote mounted radiator or no radiator.

WATER CIRCULATING SYSTEM, AUXILIARY CIRCUIT – Belt driven water circulating high capacity pump for intercooler and lube oil cooler. See S6543-36 performance curve for use with standard 10" diameter crankshaft pulley.

WATER CIRCULATING SYSTEM, ENGINE JACKET – Belt driven water circulating pump, cluster type thermostatic temperature regulating valve, full flow bypass type. Flange connections and mating flanges for (2) 4" (102 mm) inlets and (1) 5" (127 mm) outlet.

POWER RATINGS: L7042GSI VHP Series Gas Engines

Model	C.R.	Bore & Stroke in. (mm)	Displ. cu. in. (litres)	Brake Horsepower (kWb Output) 130°F (54°C) I.C. Water Temperature							
				1200 RPM		1000 RPM		900 RPM		800 RPM	
				C	I	C	I	C	I	C	I
L7042GSI	8:1	9.375" x 8.5" (238 x 216)	7040 (115)	1480 (1104)	1834 (1368)	1233 (920)	1528 (1139)	1110 (828)	1376 (1026)	987 (736)	1223 (912)

		1200 rpm		1000 rpm	
		C	I	C	I
	Power bhp (kWb)	1480 (1104)	1834 (1368)	1233 (919)	1528 (1139)
	BSFC (LHV) Btu/bhp-hr (kJ/kWh)	7696 (10774)	7457 (10550)	7458 (10553)	7225 (10222)
	Fuel Consumption Btu/hr x 1000 (kW)	11390 (3304)	13677 (4009)	9196 (2694)	11040 (3234)
Emissions	NOx g/bhp-hr (mg/nm³ @ 5% O_2)	13.00 (4815)	13.00 (4815)	13.00 (4815)	13.00 (4815)
	CO g/bhp-hr (mg/nm³ @ 5% O_2)	9.00 (3333)	9.00 (3333)	9.00 (3333)	9.00 (3333)
	THC g/bhp-hr (mg/nm³ @ 5% O_2)	2.00 (741)	2.00 (741)	2.00 (741)	2.00 (741)
	NMHC g/bhp-hr (mg/nm³ @ 5% O_2)	0.30 (111)	0.30 (111)	0.30 (111)	0.30 (111)
Heat Balance	Heat to Jacket Water Btu/hr x 1000 (kW)	3526 (1033)	4125 (1209)	2908 (852)	3380 (991)
	Heat to Lube Oil Btu/hr x 1000 (kW)	352 (103)	382 (112)	310 (91)	338 (99)
	Heat to Intercooler Btu/hr x 1000 (kW)	228 (67)	403 (118)	118 (35)	212 (62)
	Heat to Radiation Btu/hr x 1000 (kW)	662 (194)	681 (200)	584 (171)	611 (179)
	Total Exhaust Heat Btu/hr x 1000 (kW)	3281 (962)	3705 (1086)	2482 (728)	2880 (844)
Intake/ Exhaust System	Induction Air Flow scfm (Nm³/hr)	2275 (3496)	2650 (3993)	1836 (2822)	2140 (3224)
	Exhaust Flow lb/hr (kg/hr)	10124 (4592)	12070 (5475)	8173 (3707)	9745 (4421)
	Exhaust Temperature °F (°C)	1126 (608)	1145 (618)	1056 (569)	1096 (591)

Typical heat data is shown, however no guarantee is expressed or implied. Consult your Dresser Waukesha Application Engineering Department for system application assistance.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV, with a 91 WKI®. For conditions or fuels other than standard, consult the Dresser Waukesha Application Engineering Department.

Data based on standard conditions of 77°F (25°C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches HG / 1 kPa water vapor pressure).

Fuel consumption based on ISO3046/1-1995 with a tolerance of +5% for commercial quality natural gas having a 900 BTU/ft³ (35.3 MJ/nm³) SLHV.

Heat data based on fuel consumption +2%.

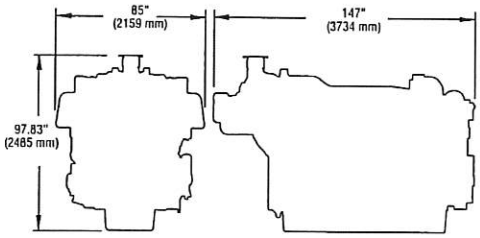
Heat rejection based on cooling exhaust temperature to 77°F (25°C).

Rating Standard: All models - Ratings are based on ISO 3046/1-1986 with mechanical efficiency of 90% and Tcra (clause 10.1) as specified above limited to ± 10° F (5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

C = ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or a maximum load indicated by the intermittent rating, whichever is lower, for two hours in every 24 hour period.

I = Intermittent Service Rating: The highest load and speed that can be applied in variable speed mechanical system application only. Operation at this rating is limited to a maximum of 3500 hours per year.

Consult your local Waukesha representative for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.



Dresser, Inc.
Dresser Waukesha
1101 West St. Paul Avenue
Waukesha, WI 53188-4999
T. 262 547 3311
F. 262 549 2795

DRESSER Waukesha

Bulletin 7011 1010

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JM
Johnson Matthey
Catalysts

400 LAPP ROAD, MALVERN, PA. 19355 T (484) 320-2136 F (484) 320-2152 www.jmusa.com

Dearing Compressor & Pump
3974 Simon Road
Youngstown, OH 44512
Attn: Mr. Mike Erickson

Date 4/8/2011
ENGINE DATA SHEET
Email: mike@dearingcomp.com
Phone: 330-599-5720
Fax: 330-599-5801

ENGINE DATA	Rich Burn
Engine Mfg:	Waukesha
Engine Model:	L7042GSI
Bhp:	1480
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	1208
Operating Hours, hrs/yr:	8760

ENGINE PERFORMANCE	
Exhaust Flow, acfm:	7786.062211
Exhaust Flow, scfm:	2427
Exhaust Flow, scfh:	145639
Exhaust Flow, lb/hr:	10979
Exhaust MW:	28.6

TYPICAL (Rich Burn)	MW	
Ar, vol %:	39.9	-
N2, vol %:	28.0	79.70
O2, vol %:	32.0	0.30
H2O, vol%:	18.0	10.00
CO2, vol %:	44.0	10.00

EMISSIONS DATA	PRE	POST	% Reduction
NOx as NO2, g/Bhp-hr:	13.00	0.15	98.8%
NOx as NO2, lb/hr:	42.42	0.49	
NOx as NO2, tons/yr:	185.82	2.14	
NOx as NO2, ppmv:	2,403.94	27.74	
NOx as NO2, ppmvd @ 15% O2:	766.25	8.84	
CO, g/Bhp-hr:	9.00	0.25	97.2%
CO, lb/hr:	29.37	0.82	
CO, tons/yr:	128.64	3.57	
CO, ppmv:	2,734.15	75.95	
CO, ppmvd @ 15% O2:	871.50	24.21	
VOC (NMNEHC), g/Bhp-hr:	0.40	0.16	60.0%
VOC (NMNEHC), lb/hr:	1.31	0.52	
VOC (NMNEHC), tons.yr.:	5.72	2.29	
VOC (NMNEHC), ppm:	212.66	85.06	
VOC (NMNEHC), ppm @ 15% o2:	67.78	27.11	
CH2O, g/Bhp-hr:	0.05	0.01	80.0%
CH2O, lb/hr:	0.16	0.03	
CH2O, tons.yr.:	0.71	0.14	
CH2O, ppm:	26.58	5.32	
CH2O, ppm @ 15% o2:	8.47	1.69	

Scope of Supply	QXH-80-Trip

Jack Carroll Sr. Sales Engineer phone: 484-320-2121 fax : 484-320-2152 email: carrojj@jmusa.com

Table 1 Engine Rich burn

JM
Johnson Matthey

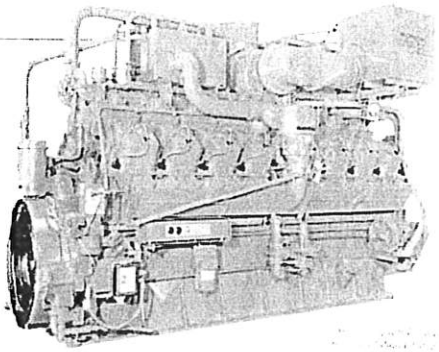
DRESSER Waukesha

P9390GSI

VHP® Series Gas Engine

1330 - 1980 BHP (988 - 1476 kW)

Specifications



Cylinders: V16
Piston Displacement: 9388 cu. in. (154 L)
Bore & Stroke: 9.375" x 8.5" (238 x 216 mm)
Compression Ratio: 8:1
Jacket Water System Capacity: 148 gal. (560 L)
Lube Oil Capacity: 165 gal. (625 L)
Starting System: 125 - 150 psi air/gas 24V electric
Dry Weight: 28,750 lb.(13,041 kg)

Standard Equipment

AIR CLEANER – Engine mounted. Dry type, including pad type precleaner and service indicator. For sheltered installation and average dust environment.

BARRING DEVICE – Manual.

BEARINGS – Heavy duty, replaceable, precision type.

BREATHER – Ejector type, extractor, plumbed into exhaust stream.

CONNECTING RODS – Drop forged steel, rifle drilled.

CONTROL SYSTEM – Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha.

CRANKCASE – Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT – Counterweighted, forged steel, ten main bearings, and dynamically balanced.

CRANKSHAFT PULLEY FRONT SEGMENT – Ten inch (254 mm) pitch diameter pulley, with six c–section drive grooves, front end drive assembly, and outboard bearing. Outboard bearing not mounted. Includes engine mounted stub shaft and coupling guard.

CYLINDERS – Removable wet type bainitic cast iron cylinder liners, chrome plated on outer diameter.

CYLINDER HEADS – Sixteen interchangeable. Two hard faced intake and two hard faced exhaust valves per cylinder. Hard faced intake and exhaust valve seat inserts. Roller valve lifters and hydraulic push rods.

ENGINE ROTATION – Counterclockwise when facing flywheel.

EXHAUST OUTLET – Single vertical at center. Flexible stainless steel connection with 14" (356 mm) flanges.

FLYWHEEL – Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters; 31.88" (810 mm) pilot bore, 30.25" (768 mm) bolt circle, (12) .75" – 10 tapped holes, or 28.88" (734 mm) pilot bore, 27.25" (692 mm) bolt circle, (12) 0.625" – 11 tapped holes and (12) 0.75"–10 tapped holes.

FLYWHEEL GUARD

FUEL SYSTEM – Dual, natural gas, 4" (102 mm) duplex downdraft. Two mounted Fisher 99, 2" (51 mm) gas regulators, 30 - 60 psi (207 - 414 kPa) inlet pressure required.

GOVERNOR – Woodward UG–8LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION – Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INSTRUMENT PANEL – Engine mounted. Includes jacket water temperature, lube oil pressure, lube oil temperature, intake manifold compound vacuum pressure, intake manifold temperature gauges, and digital electronic tachometer.

INTERCOOLER – Air–to–water.

LEVELING BOLTS

LIFTING EYES

LUBRICATION – Full pressure. Gear type pump. Full flow filter, 45 gallon (170 litres) capacity, not mounted. Includes lube oil strainer (mounted on engine) and flexible connections (shipped loose). Air/gas motor driven prelube pump. Requires final piping.

MANIFOLDS – Exhaust, (2) water cooled.

OIL COOLER – With thermostatic temperature controller and pressure regulating valve. Not mounted.

OIL PAN – Base type. 165 gallon (625 litres) capacity including filter and cooler.

PAINT – Oilfield orange primer.

PISTONS – Aluminum with floating pin. Oil cooled.

SHIPPING SKID – For domestic truck or rail.

TURBOCHARGERS – Two with water cooled bearing housings. Wastegate controlled.

VIBRATION DAMPER – Viscous type. Guard included with remote mounted radiator or no radiator.

WATER CIRCULATING SYSTEM, AUXILIARY CIRCUIT – Belt driven water circulating high capacity pump for intercooler and lube oil cooler. See S6535-14 performance curve for use with standard 10" diameter crankshaft pulley.

WATER CIRCULATING SYSTEM, ENGINE JACKET – Belt driven water circulating pump, 175 – 180° F (79 – 82° C) individual cylinder thermostats, full flow bypass. Flange connections and mating flanges for (2) 4.5" (114 mm) inlets and (1) 6" (152 mm) outlet.

POWER RATINGS: P9390GSI VHP Series Gas Engines

Model	C.R.	Bore & Stroke in. (mm)	Displ. cu. in. (litres)	Brake Horsepower (kWb Output) 130°F (54°C) I.C. Water Temperature							
				1200 RPM		1000 RPM		900 RPM		800 RPM	
				C	I	C	I	C	I	C	I
P9390GSI	8:1	9.375" x 8.5" (238 x 216)	9388 (154)	1980 (1476)	2447 (1825)	1650 (1230)	2039 (1520)	1485 (1107)	1835 (1368)	1320 (984)	1631 (1216)

		1200 rpm		1000 rpm	
		C	I	C	I
	Power bhp (kWb)	1980 (1476)	2447 (1825)	1650 (1230)	2039 (1520)
	BSFC (LHV) Btu/bhp-hr (kJ/kWh)	7792 (11027)	7763 (10979)	7648 (10823)	7405 (10682)
	Fuel Consumption Btu/hr x 1000 (kW)	15428 (4521)	18997 (5566)	12619 (3698)	15099 (4510)
Emissions	NOx g/bhp-hr (mg/nm³ @ 5% O_2)	13.00 (4815)	13.00 (4815)	13.00 (4815)	13.00 (4815)
	CO g/bhp-hr (mg/nm³ @ 5% O_2)	9.00 (3333)	9.00 (3333)	9.00 (3333)	9.00 (3333)
	THC g/bhp-hr (mg/nm³ @ 5% O_2)	2.00 (741)	2.00 (741)	2.00 (741)	2.00 (741)
	NMHC g/bhp-hr (mg/nm³ @ 5% O_2)	0.30 (111)	0.30 (111)	0.30 (111)	0.30 (111)
Heat Balance	Heat to Jacket Water Btu/hr x 1000 (kW)	4901 (1436)	5920 (1735)	4187 (1227)	4760 (1394)
	Heat to Lube Oil Btu/hr x 1000 (kW)	510 (150)	595 (174)	453 (133)	514 (151)
	Heat to Intercooler Btu/hr x 1000 (kW)	314 (92)	466 (136)	210 (61)	273 (80)
	Heat to Radiation Btu/hr x 1000 (kW)	715 (209)	846 (248)	638 (187)	777 (228)
	Total Exhaust Heat Btu/hr x 1000 (kW)	4527 (1327)	5665 (1661)	3404 (998)	4260 (1248)
Intake/Exhaust System	Induction Air Flow scfm (Nm³/hr)	3081 (4735)	3505 (5384)	2520 (3873)	2745 (4222)
	Exhaust Flow lb/hr (kg/hr)	13713 (6220)	16320 (7403)	11216 (5088)	12810 (5810)
	Exhaust Temperature °F (°C)	1177 (636)	1250 (677)	1109 (599)	1192 (644)

Typical heat data is shown, however no guarantee is expressed or implied. Consult your Dresser Waukesha Application Engineering Department for system application assistance.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV, with a 91 WKI®. For conditions or fuels other than standard, consult the Dresser Waukesha Application Engineering Department.

Data based on standard conditions of 77°F (25°C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches HG / 1 kPa water vapor pressure).

Fuel consumption based on ISO3046/1-1995 with a tolerance of +5% for commercial quality natural gas having a 900 BTU/ft³ (35.3 MJ/nm³) SLHV.

Heat data based on fuel consumption +2%.

Heat rejection based on cooling exhaust temperature to 77°F (25°C).

Rating Standard: All models - Ratings are based on ISO 3046/1-1986 with mechanical efficiency of 90% and Tcra (clause 10.1) as specified above limited to ± 10° F (5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

C = ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or a maximum load indicated by the intermittent rating, whichever is lower, for two hours in every 24 hour period.

I = Intermittent Service Rating: The highest load and speed that can be applied in variable speed mechanical system application only. Operation at this rating is limited to a maximum of 3500 hours per year.

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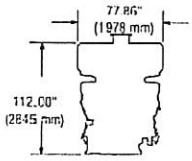

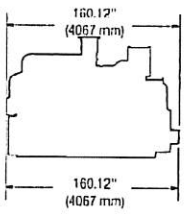

Dresser, Inc.
Dresser Waukesha
1101 West St. Paul Avenue
Waukesha, WI 53188-4999
T. 262 547 3311
F. 262 549 2795

DRESSER Waukesha

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Catalysts

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Dearing Compressor & Pump
3974 Simon Road
Youngstown, OH 44512
Attn: Mr Mike Erickson

Date 4/8/2011
ENGINE DATA SHEET
Email: mike@dearingcomp.com
Phone: 330-599-5720
Fax: 330-599-5801

ENGINE DATA	Rich Burn
Engine Mfg:	Waukesha
Engine Model:	P9390GSI
Bhp:	1980
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	1215
Operating Hours, hrs/yr:	8760

ENGINE PERFORMANCE	
Exhaust Flow, acfm:	10214.42321
Exhaust Flow, scfm:	3171
Exhaust Flow, scfh:	190263
Exhaust Flow, lb/hr:	14343
Exhaust MW:	28.6

TYPICAL (Rich Burn)	MW		
Ar, vol %:	39.9		-
N2, vol %:	28.0		79.70
O2, vol %:	32.0		0.30
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	PRE	POST	% Reduction
NOx as NO2, g/Bhp-hr:	13.00	0.15	98.8%
NOx as NO2, lb/hr:	56.76	0.65	
NOx as NO2, tons/yr:	248.59	2.87	
NOx as NO2, ppmv:	2,461.79	28.41	
NOx as NO2, ppmvd @ 15% O2:	784.69	9.05	
CO, g/Bhp-hr:	9.00	0.25	97.2%
CO, lb/hr:	39.29	1.09	
CO, tons/yr:	172.10	4.78	
CO, ppmv:	2,799.94	77.78	
CO, ppmvd @ 15% O2:	892.47	24.79	
VOC (NMNEHC), g/Bhp-hr:	0.12	0.05	60.0%
VOC (NMNEHC), lb/hr:	0.52	0.21	
VOC (NMNEHC), tons.yr.:	2.29	0.92	
VOC (NMNEHC), ppm:	65.33	26.13	
VOC (NMNEHC), ppm @ 15% o2:	20.82	8.33	
CH2O, g/Bhp-hr:	0.05	0.01	80.0%
CH2O, lb/hr:	0.22	0.04	
CH2O, tons.yr.:	0.96	0.19	
CH2O, ppm:	27.22	5.44	
CH2O, ppm @ 15% o2:	8.68	1.74	

Scope of Supply	QXH-O-90-Quad

Jack Carroll Sr. Sales Engineer phone: 484-320-2121 fax : 484-320-2152 email: carrojj@jmusa.com

Table I Engine Rich burn

Johnson Matthey

FLARE INDUSTRIES
INNOVATIVE COMBUSTION SOLUTIONS

ENGINEERING PROPOSAL

MARK WEST
CANONSBURG, PA

PROJECT

MARK WEST
CANONSBURG, PA
VAPOR COMUBSTION UNITS

Prepared for:	Daniel Domsic (724) 754-9213 ext. 3813 Daniel.Domsic@markwest.com
Sales Contact:	Joshua Kurtenbach, Regional Sales Manager – Mid-Atlantic T +1 (724) 271-1030 jkurtenbach@flareindustries.com
Prepared by:	José Miguel Peña, Senior Sales Engineer Austin, Texas USA T +1 (512) 836-9473 F +1 (512) 836-3025 jpena@flareindustries.com
Date:	November 11, 2013
Quote No.:	13-0966
Revision:	1

1.0 COMMERCIAL SUMMARY

1.1 SCOPE OF WORK

1.1.1 FEF-48

Our fully enclosed flare package has no flame is visible during operation.

- Completely enclosed for combusting tank vapors
- 100% Smokeless combustion
- 98% Destruction Efficiency

1 1 **Forced Draft FEF-48F Combustion Chamber:**
- 48 inch Equivalent Diameter x 20 ft Overall Height
- (1) Thermocouple Port, Thermowell & Type K Thermocouple for Over fire Protection
- 2 inch High-Temperature Thermal Insulation
- Stainless Steel Rain Guard to Protect Internal Insulation
- Material of Construction – Carbon Steel
- ***Carboline Carbozinc Primer & Carboline - HG11 Epoxy Topcoat (Grey)***
- Forced Draft Base Assembly complete with:
  - 3 Leg Substructure

2 1 **MAVP Air-Assist Burner:**
- High capacity / high efficiency air flare tip design
- Narrow exit slots providing a large air/fuel boundary for 100% smokeless capacity
- Integral air blower.
- Tip materials of construction:
  - Flare burner and outer flare tip – 316/304 stainless steel

3 1 **LUMINEX Continuous Pilot Assembly:**
- Electronic Spark Ignition
- Pilot Monitoring via UV Scanner
- Material of Construction – Stainless Steel
- ½ inch NPT Pilot Gas Connection
- Pilot materials of construction:
  - Pilot Head – 310 stainless steel/ Pilot body – 316 stainless steel

4 1 **FEF Control System :**
- NEMA 4X Weather-proof Controls Enclosure
- Pilot Monitoring, Status Indication, & Failure Alarm/Shutdowns
  - Flame Failure Shutdown/High Temperature Shutdown
- Automatic Ignition
- U.L. Listed Flame Safeguard System
- Form "C" Dry Contacts for Customer Alarms
- *NEMA 7/4X Cast Aluminum Transformer Enclosure at Flare*

5 1 **Pilot gas valve train:**
- Aluminum body regulator
- Ball valve and strainer
- Pressure Gauge
- Solenoid shut off valve

AEREON

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TECHNOLOGIES

5051 COMMERCE CROSSINGS DRIVE | LOUISVILLE, KY 40229

JORDAN
TECHNOLOGIES
An Aereon Company

Markwest Energy Partners– Ohio Gathering
15-10165

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1.2 Design Guidelines

Design Vapor Rate (Per truck)	600 gpm	**Inlet Pressure**	12"H2O
Maximum truck load (per cycle)	1	**Minimum Time Between Trucks**	7 Hours
Average VOC concentration	40% (Max 50%)	**Discharge Vent**	3"
Concentrate return line connection	2" flanged	**Inlet Truck Connection**	3" Cam Lock

1.3 General Operation

When the inlet pressure to the Air Defender reaches a field adjustable set point, the carbon bed valves will open to allow the start of truck loading. The truck vapors/ air mixture will load onto the carbon beds. The carbon will adsorb the VOC vapors (99%) and expel oxygen into the atmosphere. This mode of operation will continue until truck loading has ended. At this point adsorption of the truck VOC vapors will cease. The regeneration mode will then automatically start. The concentrated volatile organic gas (less O2) stream will then be removed from the carbon beds via a vacuum pump circuit. The concentrated VOC stream will then be sent back via a discharge liquid scrubber to the storage tank head space as a pure VOC gas with over 90% of the oxygen removed. Additional oxygen removal options can be purchased to achieve a 98.5% or greater oxygen reduction.

1.4 Service

Jordan Technologies' trusted global service department will be able to provide all of your service needs. Jordan employs the largest service division in the vapor recovery and combustion industry with service technicians conveniently located in all major shale plays. **Your local service technicians are located in Washington PA**

1.5 Recommended maintenance

Check oil level	Monthly
Check for oil leaks	Monthly
Top off vacuum pump oil if needed	Monthly
Check electrical connections	Semi Annually
Check for vacuum leaks	Semi Annually
Record operating data	Semi Annually
Inspect piping and hoses	Semi Annually

1.6 Freight

- EX Works, FOB Factory Louisville, KY

1.7 Additional Work

- Subsequent revisions, at customer request, will require additional engineering charges as noted above and will create potential extension of equipment lead-time.
- These drawings and associated BOM's will be Jordan's interpretation of the customer specifications at the time that the drawings are created. Deviations from these drawings after approval will require additional Engineering Change Orders.
- Any additional engineering or design work outside the scope or the request for bid and specifications provided will be charged at ***$140.00*** per hour.
- All additional work or changes in scope of supply will be documented via change order signed by both parties at an agreed upon price prior to the start of change order fabrication.

1.8 Documentation

- Jordan Technologies, Inc. will provide general arrangement drawings, a P&ID, electrical drawings and quantified documentation as described in Firm Pricing and Systems Options.

1.9 Start Up

- Jordan will provide personnel to perform start up checks at published rates. Start-up should be scheduled 2 weeks prior and will be billed at $1,400.00 per day plus travel expenses.
  Note: ***Warranty is voided if the startup is conducted by a non-certified Jordan Representative.***

2.0 Payment Terms

- Purchase Orders should be issued to Jordan Technologies, Inc.
- All payments should be forwarded to
  Jordan Technologies, Inc., 5051 Commerce Crossings Dr. , Louisville Kentucky, 40229
- Purchase option:
  - 25% on receipt of order,
  - 35% on delivery of construction drawings for approval, and
  - 40% billed on notification of ready to ship
- All invoice payments should be paid in 30 days with approved credit application
- General Warranty:
  - All parts are covered for 1 year or the manufacturer's warranty whichever is shorter
  - For complete details contact your Jordan Representative
- Jordan VRUs are sized based on customer provided parameters and should be operated only after reading the operations manual and receiving proper training.
- Customer will supply a pad constructed of suitable material to create a solid foundation for the unit
- Customer has obtained and paid all fees for permits which may be required to install and operate a natural gas compressing unit.

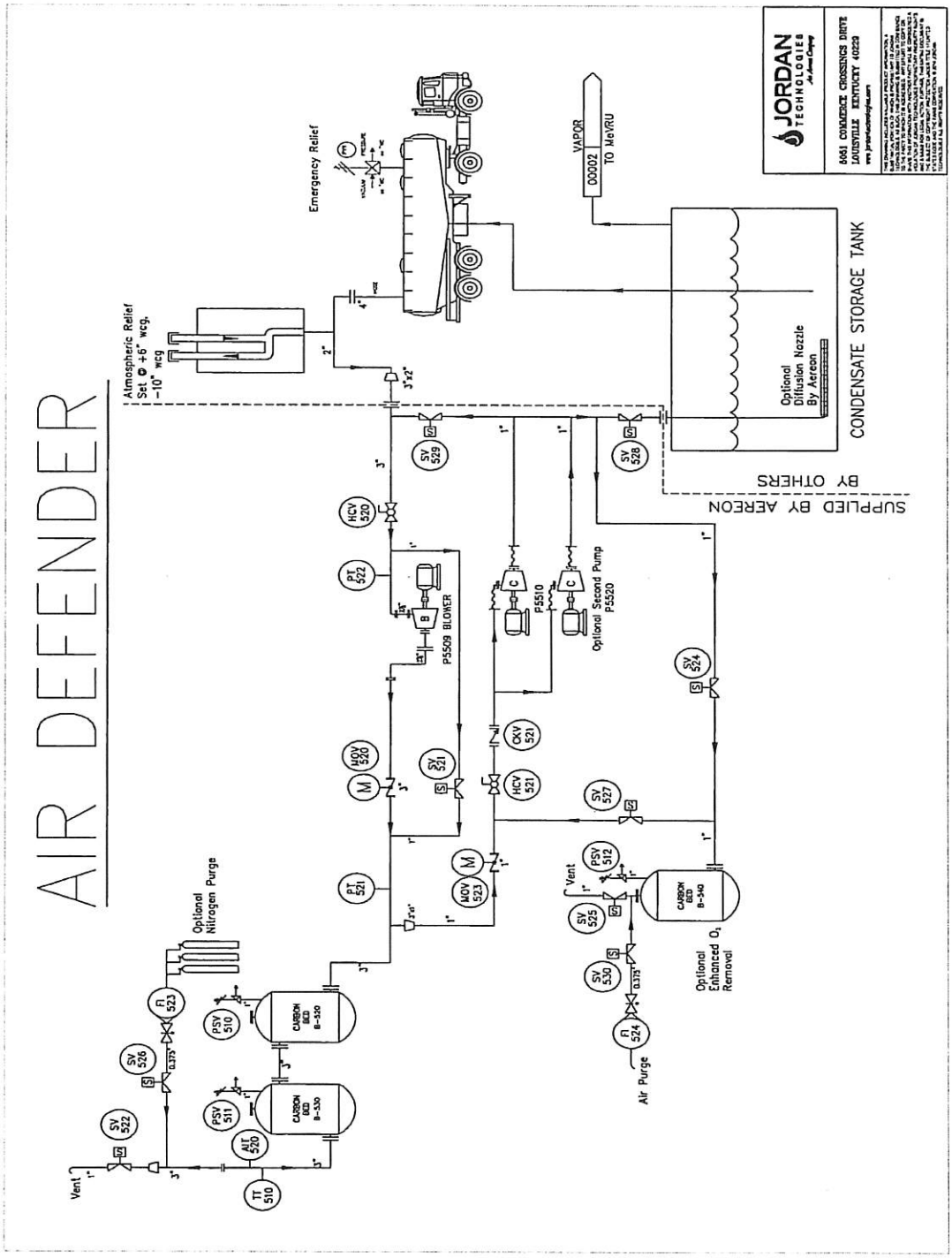
3.0 Addendums

Addendum 1: Control Panel Details

Typical control panel we are currently installing on our systems.

1) Covered 6" touch screen: handles system monitoring, SCADA functions, and shutdowns.
2) 110VAC and 24VDC instrumentation power supplies.
3) NEMA 3R enclosure (to be mounted in an unclassified area)

Addendum 2: Typical Air Defender P&ID (for reference only)



Smith CS

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1, Suite 1600
Denver, CO 80202-2126
(303) 925-9200

November 8, 2018

Mr. Tom Josephs

Environmental Engineer Manager (Permits)
PADEP SW Regional Office
400 Waterfront Dr.
Pittsburgh, PA 15222-4739

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station – SOOP Application

Dear Mr. Gorog:

MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) hereby submits a State Only Operating Permit (SOOP) for the Smith Compressor Station located in Smith Township, Washington County, Pennsylvania. MarkWest is submitting the SOOP as required by a Consent Decree between the USEPA, the PADEP and MarkWest in 2018. The SOOP is required to have specific requirements and limitations for the operation of 'pig' launchers and receivers at the Three Brothers site.

This application includes all of the existing operational equipment in the most recent GP-5 application including the pig launchers and receivers. This application also seeks to make updates and corrections to existing equipment including: updating the fugitive component count and emission estimates, pigging emissions, updated GRI-GLYCalc, HYSYS and TANKS 4.0.9d simulations, maintenance activities, and emissions from compressor rod packing. With all these corrections the Three Brothers Compressor Station still remains a natural minor source.

Should you have any questions about this SOOP application, please contact me at (303) 542-0686 or via email at nwheldon@markwest.com.

Sincerely,

Nathan M. Wheldon, PE
Sr. Manager – Air Programs

MarkWest Liberty Midstream & Resources, LLC

Smith Compressor Station

Smith Township, Washington County

Air Quality

State Only Operating Permit (SOOP) Application

Natural Gas Processing Plant

Current Approval No #: 63-00968A

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Section 1
Introduction

Introduction
MarkWest Liberty Midstream & Resource, LLC
Smith Compressor Station

The Smith Compressor Station is a compression and dehydration facility. Field natural gas from the surrounding areas enters the compressor station via one of three low pressure receivers. Once received, the incoming stream first passes through slug catchers and a phase separator to remove free liquids. Liquids are sent to the water/condensate tanks and the gas continues through a series of filters and scrubbers to remove particulates and oil droplets that may cause damage to downstream equipment. The gas continues through the compressor engines where the pressure of gas is raised to transport the gas downstream to a processing facility. After compression the gas is passed through the dehydration tower to remove residual water from the gas stream. The water recovered from the dehydration unit is also sent to the water/condensate tanks for storage. Once the gas has been dehydrated it is reinserted into a high pressure pipeline and sent to a gas processing plant for further processing. The liquids captured in the water/condensate tanks are removed by truck for disposal and/or further processing.

On August 28, 2012 MarkWest Liberty Midstream & Resources, LLC received a Plan Approval Permit (GP5-63-00969A) to construct and operate the Smith Compressor Station located Smith Township, Washington County, PA. MarkWest has finalized construction and has been operating under this Plan Approval, with extensions, after having also submitted an application for authorization to use the GP-5 Permit on September 8, 2016, which has not yet been acted on by the Department. MarkWest is now submitting an application for a SOOP, as required in a Consent Decree between the USEPA, PADEP and MarkWest. Once issued, the SOOP will replace the Plan Approval and MarkWest will rescind the application for the GP-5 permit. This SOOP application seeks to authorize the operation of the following emission sources:

- Eight (8) Waukesha P9390GSI 1980 hp rich burn engines and associated emissions with 3-way catalysts
- Two (2) Waukesha L7042G 1480hp rich burn engines and associated emissions with 3-way catalysts
- One (1) 130MM scfd dehydration unit
- One (1) 2.0MM Btu/hr. re-boiler associated with the dehydration unit
- One (1) 7.0 mmbtu/hr flare to control emissions from dehydration unit off-gas
- One (1) 500bbl gun-barrel separation tank
- Four (4) 400bbl condensate and/or produced water tanks
    - Note: The storage tanks are controlled with a Vapor Recovery Unit (VRU) designed to control 100% of the flashing, breathing and evaporative losses. 98% control is being claimed to account for minor outages, etc...

Regulatory Review:

Federal New Source Performance Standards require new, modified, or reconstructed sources to control emissions to the level that is achievable by the best system of emission reduction as specified in the provisions of the applicable rule. The following section provides applicability determinations for each of the NSPS to which the Smith Compressor Station is potential subject.

40 CFR Part 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984.
The storage tanks were built after July 23, 1984. However, the tanks have a design capacity less than 1,589.874 m3 (10,000 bbl) and are used to store condensate prior to custody transfer. Therefore, the tanks are exempt from the requirements of NSPS Subpart Kb [40 CFR 60.110b(d)(4)].

40 CFR Part 60, Subpart LLL – Standards of Performance for SO2 Emissions from Onshore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984 and on or August 23, 2011.
The compressor station is not an Onshore Natural Gas Processing unit, therefore, Subpart LLL does not apply.

40 CFR Part 60 Subpart IIII - Standards of Performance for Compression Ignition Internal Combustion Engines:
This subpart applies to diesel-fired engines. The Smith Compressor Station does not have any diesel-powered engines as part of this application. At times diesel-fired power generation may be required to run the station during an upset in grid power to the facility. These engines meet the EPA criteria of non-road portable engines and as such are exempt from permitting, however, records will be kept to also show that the engines meet the exemption requirements specified in 25 Pa. Code 127.14(a)(8) Number 6.

40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines:
The natural gas-fired compressor engines are stationary spark ignition internal combustion engines manufactured after July 1, 2007 and are therefore subject to this subpart. As such MarkWest is subject to all the applicable requirements, including stack emission tests, in accordance with the subpart.

40 CFR Part 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution:
This subpart applies to sources at natural gas production facilities for which construction commenced after August 23, 2011. The following sections outline the applicability of the various components outlined under NSPS Subpart OOOO:

> **Reciprocating Compressors –** Each reciprocating compressor is subject to NSPS if it was constructed after August 23, 2011. Each compressor at the Smith Compressor Station was constructed after August 23, 2011 and is therefore subject to this rule. For reciprocating compressors NSPS OOOO requires the replacement of rod packing every 26,000 hours or every 36 months of operation for each compressor. MarkWest meets this requirement by tracking the hours on each compressor and the maintenance intervals at which each rod packing replacement occurs.
>
> **Pneumatic Controllers –** Pneumatic controllers are subject to NSPS OOOO if they are continuous bleed natural gas-driven operating at a natural gas bleed rate greater than 6 scfh. The Smith Compressor Station does not utilize any natural gas-driven pneumatic controllers with a continuous bleed rate greater than 6 scfh. Therefore, there are no pneumatic controllers subject to the requirements of NSPS OOOO.

Storage Vessels – NSPS OOOO applies to each storage vessel with the potential for VOC emissions equal to or greater than 6 tpy. As demonstrated in the emission calculations the storage tanks will not exceed VOC emissions limit of six (6) tpy with the use of the VRU. Therefore, these tanks are not considered affected facilities under NSPS OOOO.

Fugitive Components – NSPS OOOO incorporates by reference LDAR requirements to equipment that is located at an onshore natural gas processing plant. The Smith Compressor Station does not meet the definition of an onshore natural gas processing plant. Therefore, the equipment leak standards in NSPS OOOO do not apply.

MarkWest does not have any gas wells, centrifugal compressors or sweetening units at the Smith Compressor Station, therefore, these parts of NSPS OOOO do not apply.

40 CFR Part 60 Subpart OOOOa - Standards of Performance for Crude Oil and Natural Gas Facilities:
NSPS Subpart OOOOa applies to facilities constructed, modified, or reconstructed after September 18, 2015. The Smith Compressor Station completed construction prior to September 18, 2015 and is therefore not subject to NSPS OOOOa.

40 CFR Part 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities:
The dehydration unit at the facility is potentially subject to eh Subpart HH. However, potential benzene emissions from the unit are less than 0.90 megagrams per year. As such, the only applicable requirement is to keep records showing that the unit continues to comply with the exemption criterion.

40 CFR Part 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Source Categories from Stationary Reciprocating Internal Combustion Engines:
The facility is a minor (area) source of hazardous air pollutants (HAP). The proposed natural gas-fired engines are stationary reciprocating internal combustion engines (RICE) and commenced construction after the June 12, 2006 effective date for new stationary RICE at area sources and are therefore subject to this subpart. The engines meet requirements by compliance with Subpart JJJJ. No further requirements apply for these engines under this subpart.

The following is included with this application:

- Introduction
- General Information Form
- Municipal Notifications
- Compliance History Form
- SOOP Application
- Emission Estimates
- Payment of $750 to cover the application fee and first year operating fee

Section 2

General Information Form (GIF)

8000-PM-IT0001 Rev. 10/2009
Form

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL INFORMATION FORM – AUTHORIZATION APPLICATION

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this application package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

Related IDs (If Known)		DEP USE ONLY
Client ID# 271958	APS ID#	Date Received & General Notes
Site ID#	Auth ID#	
Facility ID#		

CLIENT INFORMATION

DEP Client ID#	Client Type / Code
271958	OWOP

Organization Name or Registered Fictitious Name	Employer ID# (EIN)	Dun & Bradstreet ID#
MarkWest Liberty Midstream & Resources, L.L.C.	30-0528059	

Individual Last Name	First Name	MI	Suffix	SSN

Additional Individual Last Name	First Name	MI	Suffix	SSN

Mailing Address Line 1	Mailing Address Line 2
1515 Arapahoe Street Tower 1, Suite 1600	

Address Last Line – City	State	ZIP+4	Country
Denver	CO	80202-2137	USA

Client Contact Last Name	First Name	MI	Suffix
Wheldon	Nathan		

Client Contact Title	Phone	Ext
Sr. Manager – Air Programs	(303) 542-0686	

Email Address	FAX
nwheldon@markwest.com	(303) 825-0920

SITE INFORMATION

DEP Site ID#	Site Name
	Smith Compressor Station

EPA ID#	Estimated Number of Employees to be Present at Site

Description of Site
Natural Gas Processing

County Name	Municipality	City	Boro	Twp	State
Washington	Smith	☐	☐	☒	
County Name	**Municipality**	**City**	**Boro**	**Twp**	**State**
		☐	☐	☐	

Site Location Line 1	Site Location Line 2
320 Point Pleasant Road	Smith Township

Site Location Last Line – City	State	ZIP+4
Burgettstown	PA	15021

Detailed Written Directions to Site
From Pittsburgh head west on Hwy 22 to Exit 60A, stay left on Steubenville Pike (0.9 mi.), take left onto Creek Rd (0.5 mi.), keep left on Point Pleasant Rd. (0.4 mi.), turn left onto lease road to Smith CS.

Site Contact Last Name	First Name	MI	Suffix
Uhl	William		

Site Contact Title	Site Contact Firm
General Manager	MarkWest Liberty Midstream and Resources

Mailing Address Line 1	Mailing Address Line 2
4600 J. Barry Court	Suite 500

Mailing Address Last Line – City	State	ZIP+4
Canonsburg	PA	15317

Phone	Ext	FAX	Email Address
(724) 514-4324			William.Uhl@markwest.com

NAICS Codes (Two- & Three-Digit Codes – List All That Apply): 211111

6-Digit Code (Optional): NA

Client to Site Relationship
OWNOP

FACILITY INFORMATION

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☐	☒
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☐	☒

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

	Facility Type	DEP Fac ID#		Facility Type	DEP Fac ID#
☒	Air Emission Plant		☐	Industrial Minerals Mining Operation	
☐	Beneficial Use (water)		☐	Laboratory Location	
☐	Blasting Operation		☐	Land Recycling Cleanup Location	
☐	Captive Hazardous Waste Operation		☐	MineDrainageTrmt/LandRecyProjLocation	
☐	Coal Ash Beneficial Use Operation		☐	Municipal Waste Operation	
☐	Coal Mining Operation		☐	Oil & Gas Encroachment Location	
☐	Coal Pillar Location		☐	Oil & Gas Location	
☐	Commercial Hazardous Waste Operation		☐	Oil & Gas Water Poll Control Facility	
☐	Dam Location		☐	Public Water Supply System	
☐	Deep Mine Safety Operation -Anthracite		☐	Radiation Facility	
☐	Deep Mine Safety Operation -Bituminous		☐	Residual Waste Operation	
☐	Deep Mine Safety Operation -Ind Minerals		☐	Storage Tank Location	
☐	Encroachment Location (water, wetland)		☐	Water Pollution Control Facility	
☐	Erosion & Sediment Control Facility		☐	Water Resource	
☐	Explosive Storage Location		☐	Other:	

Latitude/Longitude Point of Origin	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Smith Compressor Station	40	25	04	80	21	24

Horizontal Accuracy Measure Feet --or-- Meters

Horizontal Reference Datum Code
- ☐ North American Datum of 1927
- ☐ North American Datum of 1983
- ☐ World Geodetic System of 1984

Horizontal Collection Method Code

Reference Point Code

Altitude Feet 1155 --or-- Meters

Altitude Datum Name
- ☐ The National Geodetic Vertical Datum of 1929
- ☐ The North American Vertical Datum of 1988 (NAVD88)

Altitude (Vertical) Location Datum Collection Method Code

Geometric Type Code

Data Collection Date

Source Map Scale Number Inch(es) = Feet
--or-- Centimeter(s) = Meters

PROJECT INFORMATION

Project Name
Smith Compressor Station

Project Description
Convert Plan Approval to GP-5 Permit.

Project Consultant Last Name **First Name** **MI** **Suffix**

Project Consultant Title **Consulting Firm**

Mailing Address Line 1 **Mailing Address Line 2**

Address Last Line – City **State** **ZIP+4**

Phone	Ext	FAX	Email Address

Time Schedules	Project Milestone (Optional)

1. **Have you informed the surrounding community and addressed any concerns prior to submitting the application to the Department?** ☐ Yes ☒ No

2. **Is your project funded by state or federal grants?** ☐ Yes ☒ No
   Note: If "Yes", specify what aspect of the project is related to the grant and provide the grant source, contact person and grant expiration date.
   Aspect of Project Related to Grant
   Grant Source: _____
   Grant Contact Person: _____
   Grant Expiration Date: _____

3. **Is this application for an authorization on Appendix A of the Land Use Policy? (For referenced list, see Appendix A of the Land Use Policy attached to GIF instructions)** ☐ Yes ☒ No
   Note: If "No" to Question 3, the application is not subject to the Land Use Policy.
   If "Yes" to Question 3, the application is subject to this policy and the Applicant should answer the additional questions in the **Land Use Information** section.

LAND USE INFORMATION

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

1. **Is there an adopted county or multi-county comprehensive plan?** ☒ Yes ☐ No
2. **Is there an adopted municipal or multi-municipal comprehensive plan?** ☒ Yes ☐ No
3. **Is there an adopted county-wide zoning ordinance, municipal zoning ordinance or joint municipal zoning ordinance?** ☒ Yes ☐ No
   Note: If the Applicant answers "No" to either Questions 1, 2 or 3, the provisions of the PA MPC are not applicable and the Applicant does not need to respond to questions 4 and 5 below.
   If the Applicant answers "Yes" to questions 1, 2 and 3, the Applicant should respond to questions 4 and 5 below.
4. **Does the proposed project meet the provisions of the zoning ordinance or does the proposed project have zoning approval?** If zoning approval has been received, attach documentation. ☒ Yes ☐ No
5. **Have you attached Municipal and County Land Use Letters for the project?** ☐ Yes ☒ No
   Will provide information upon request.

COORDINATION INFORMATION

Note: The PA Historical and Museum Commission must be notified of proposed projects in accordance with DEP Technical Guidance Document 012-0700-001 and the accompanying Cultural Resource Notice Form.

If the activity will be a mining project (i.e., mining of coal or industrial minerals, coal refuse disposal and/or the operation of a coal or industrial minerals preparation/processing facility), respond to questions 1.0 through 2.5 below.

If the activity will not be a mining project, skip questions 1.0 through 2.5 and begin with question 3.0.

1.0	**Is this a coal mining project?** If "Yes", respond to 1.1-1.6. If "No", skip to Question 2.0. (DEP Use/48y1)	☐	Yes	☒	No
1.1	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be equal to or greater than 200 tons/day?** (DEP Use/4x70)	☐	Yes	☐	No
1.2	**Will this coal mining project involve coal preparation/ processing activities in which the total amount of coal prepared/processed will be greater than 50,000 tons/year?** (DEP Use/4x70)	☐	Yes	☐	No
1.3	**Will this coal mining project involve coal preparation/ processing activities in which thermal coal dryers or pneumatic coal cleaners will be used?** (DEP Use/4x70)	☐	Yes	☐	No
1.4	**For this coal mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
1.5	**Will this coal mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No
1.6	**Will this coal mining project involve underground coal mining to be conducted within 500 feet of an oil or gas well?** (DEP Use/4z41)	☐	Yes	☐	No
2.0	**Is this a non-coal (industrial minerals) mining project?** If "Yes", respond to 2.1-2.6. If "No", skip to Question 3.0. (DEP Use/48y1)	☐	Yes	☒	No
2.1	**Will this non-coal (industrial minerals) mining project involve the crushing and screening of non-coal minerals other than sand and gravel?** (DEP Use/4x70)	☐	Yes	☐	No
2.2	**Will this non-coal (industrial minerals) mining project involve the crushing and/or screening of sand and gravel with the exception of wet sand and gravel operations (screening only) and dry sand and gravel operations with a capacity of less than 150 tons/hour of unconsolidated materials?** (DEP Use/4x70)	☐	Yes	☐	No
2.3	**Will this non-coal (industrial minerals) mining project involve the construction, operation and/or modification of a portable non-metallic (i.e., non-coal) minerals processing plant under the authority of the General Permit for Portable Non-metallic Mineral Processing Plants (i.e., BAQ-PGPA/GP-3)?** (DEP Use/4x70)	☐	Yes	☐	No
2.4	**For this non-coal (industrial minerals) mining project, will sewage treatment facilities be constructed and treated waste water discharged to surface waters?** (DEP Use/4x62)	☐	Yes	☐	No
2.5	**Will this non-coal (industrial minerals) mining project involve the construction of a permanent impoundment meeting one or more of the following criteria: (1) a contributory drainage area exceeding 100 acres; (2) a depth of water measured by the upstream toe of the dam at maximum storage elevation exceeding 15 feet; (3) an impounding capacity at maximum storage elevation exceeding 50 acre-feet?** (DEP Use/3140)	☐	Yes	☐	No
3.0	**Will your project, activity, or authorization have anything to do with a well related to oil or gas production, have construction within 200 feet of, affect an oil or gas well, involve the waste from such a well, or string power lines above an oil or gas well?** If "Yes", respond to 3.1-3.3. If "No", skip to Question 4.0. (DEP Use/4z41)	☒	Yes	☐	No

3.1	**Does the oil- or gas-related project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water (including wetlands)?** (DEP Use/4z41)	☐	Yes	☒	No
3.2	**Will the oil- or gas-related project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system?** If "Yes", discuss in *Project Description*. (DEP Use/4z41)	☐	Yes	☒	No
3.3	**Will the oil- or gas-related project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4z41)	☐	Yes	☒	No
4.0	**Will the project involve a construction activity that results in earth disturbance?** If "Yes", specify the total disturbed acreage. (DEP Use/4x66) **4.0.1 Total Disturbed Acreage**	☐	Yes	☒	No
5.0	**Does the project involve any of the following?** If "Yes", respond to 5.1-5.3. If "No", skip to Question 6.0. (DEP Use/4x10)	☐	Yes	☒	No
5.1	**Water Obstruction and Encroachment Projects – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a watercourse, floodway or body of water?** (DEP Use /4x10).	☐	Yes	☒	No
5.2	**Wetland Impacts – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a wetland?** (DEP Use/4x10).	☐	Yes	☒	No
5.3	**Floodplain Projects by the commonwealth, a Political Subdivision of the commonwealth or a Public Utility – Does the project involve any of the following: placement of fill, excavation within or placement of a structure, located in, along, across or projecting into a floodplain?** (DEP Use /4x10).	☐	Yes	☒	No
6.0	**Will the project involve discharge of stormwater or wastewater from an industrial activity to a dry swale, surface water, ground water or an existing sanitary sewer system or separate storm water system?** (DEP Use/4x62)	☐	Yes	☒	No
7.0	**Will the project involve the construction and operation of industrial waste treatment facilities?** (DEP Use/4x62)	☐	Yes	☒	No
8.0	**Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations?** If "Yes", indicate estimated proposed flow (gal/day). Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/name of downstream sewage facilities in the *Project Description*, where applicable. (DEP Use/4x62) **8.0.1 Estimated Proposed Flow (gal/day)**	☐	Yes	☒	No
9.0	**Will the project involve the subdivision of land, or the generation of 800 gpd or more of sewage on an existing parcel of land or the generation of an additional 400 gpd of sewage on an already-developed parcel, or the generation of 800 gpd or more of industrial wastewater that would be discharged to an existing sanitary sewer system?** (DEP Use/4x61).	☐	Yes	☒	No
	9.0.1 Was Act 537 sewage facilities planning submitted and approved by DEP? If "Yes" attach the approval letter. Approval required prior to 105/NPDES approval.	☐	Yes	☐	No
10.0	**Is this project for the beneficial use of biosolids for land application within Pennsylvania?** If "Yes" indicate how much (i.e. gallons or dry tons per year). (DEP Use/4X62) **10.0.1 Gallons Per Year (residential septage)** _____ **10.0.2 Dry Tons Per Year (biosolids)** _____	☐	Yes	☒	No
11.0	**Does the project involve construction, modification or removal of a dam?** If "Yes", identify the dam. (DEP Use/3140) **11.0.1 Dam Name**	☐	Yes	☒	No
12.0	**Will the project interfere with the flow from, or otherwise impact, a dam?** If "Yes", identify the dam. (DEP Use/3140) **12.0.1 Dam Name**	☐	Yes	☒	No

13.0	**Will the project involve operations (excluding during the construction period) that produce air emissions (i.e., NOX, VOC, etc.)?** If "Yes", identify each type of emission followed by the amount of that emission. (DEP Use/4x70) **13.0.1 Enter all types & amounts of emissions; separate each set with semicolons.**	☐	Yes	☒	No
14.0	**Does the project include the construction or modification of a drinking water supply to serve 15 or more connections or 25 or more people, at least 60 days out of the year?** If "Yes", check all proposed sub-facilities. (DEP Use/4x81)	☐	Yes	☒	No
	14.0.1 Number of Persons Served _____				
	14.0.2 Number of Employee/Guests _____				
	14.0.3 Number of Connections _____				
	14.0.4 Sub-Fac: Distribution System	☐	Yes	☐	No
	14.0.5 Sub-Fac: Water Treatment Plant	☐	Yes	☐	No
	14.0.6 Sub-Fac: Source	☐	Yes	☐	No
	14.0.7 Sub-Fac: Pump Station	☐	Yes	☐	No
	14.0.8 Sub Fac: Transmission Main	☐	Yes	☐	No
	14.0.9 Sub-Fac: Storage Facility	☐	Yes	☐	No
15.0	**Will your project include infiltration of storm water or waste water to ground water within one-half mile of a public water supply well, spring or infiltration gallery?** (DEP Use/4x81) and 4x52).	☐	Yes	☒	No
16.0	**Is your project to be served by an existing public water supply?** If "Yes", indicate name of supplier and attach letter from supplier stating that it will serve the project. (DEP Use/4x81) **16.0.1 Supplier's Name** _____	☐	Yes	☒	No
	16.0.2 Letter of Approval from Supplier is Attached	☐	Yes	☐	No
17.0	**Will this project involve a new or increased drinking water withdrawal from a stream or other water body?** If "Yes", should reference both Water Supply and Watershed Management. (DEP Use/4x81 and 4x10) **17.0.1 Stream Name**	☐	Yes	☒	No
18.0	**Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste?** If "Yes", indicate what type (i.e., hazardous, municipal (including infectious & chemotherapeutic), residual) and the amount to be treated, stored, re-used or disposed. (DEP/Use4x32) **18.0.1 Type & Amount**	☐	Yes	☒	No
19.0	**Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities?** (DEP Use/48y1)	☐	Yes	☒	No
20.0	**Does your project involve installation of a field constructed underground storage tank?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **20.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
21.0	**Does your project involve installation of an aboveground storage tank greater than 21,000 gallons capacity at an existing facility?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **21.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No

22.0	**Does your project involve installation of a tank greater than 1,100 gallons which will contain a highly hazardous substance as defined in DEP's Regulated Substances List, 2570-BK-DEP2724?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **22.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
23.0	**Does your project involve installation of a storage tank at a new facility with a total AST capacity greater than 21,000 gallons?** If "Yes", list each Substance & its Capacity. **Note:** Applicant may need a Storage Tank Site Specific Installation Permit. (DEP Use/2570) **23.0.1 Enter all substances & capacity of each; separate each set with semicolons.**	☐	Yes	☒	No
24.0	**Will the intended activity involve the use of a radiation source?** (DEP Use/4x90).	☐	Yes	☒	No

CERTIFICATION

I certify that I have the authority to submit this application on behalf of the applicant named herein and that the information provided in this application is true and correct to the best of my knowledge and information.

Type or Print Name Leanne Meyer

VP Corp HES

Signature **Title** **Date**

Section 3
Municipal Notifications

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1,Suite 1600
Denver, CO 80202-2137
(800) 730-8388
(303) 925-9200
(303) 825-0902 Fax

August 31, 2018

Via Certified Mail: 7010 2780 0001 4763 3009

Smith Township
PO Box 94
Slovan, PA 15078

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station – Application for State Only Operating Permit

Dear Township Officials:

This letter is being sent to notify the Township Officials that MarkWest Liberty Midstream and Resources, L.L.C (MarkWest) has applied to the Pennsylvania Department of Environmental Protection (PADEP) for a State Only Operating Permit (SOOP) for the Smith Compressor Station (Facility). The Facility currently operates under Plan Approval 63-00968A, which is due to expire on October 28, 2018 and will be renewed prior to that date. No modifications to equipment are proposed at this time. Equipment currently operating at the Facility includes eight (8) 1,980-hp Waukesha P9390GSI engines, two (2) 1,480-hp Waukesha L7042GSI engines, one (1) 130 mmscf/d glycol dehydration unit, one (1) 2.0 mmbtu/hr reboiler, one (1) 500-bbl gunbarrel tank, four (4) 400-bbl condensate and produced water storage tanks, and one flare.

The Facility is located at 320 Point Pleasant Road, Burgettstown, PA. 15021 in Smith Township, Washington County, PA.

This notice is being provided in accordance with the Municipal Notification requirements in General Plan Approval and/or General Operating Permit (BAQ-GPA/GP-5), Section A. General Conditions.

Anyone wishing to view this application may do so by making arrangements with:

Air Quality Program
PADEP - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA. 15222
(412) 442-4000

Thank you. Should you have any questions, please call me at (303) 542-0686 or e-mail at nwheldon@markwest.com.

Sincerely,

Nathan Wheldon, P.E.
Environmental Manager

Cc: Markwest file

MarkWest Liberty Midstream and Resources, L.L.C.
1515 Arapahoe Street
Tower 1,Suite 1600
Denver, CO 80202-2137
(800) 730-8388
(303) 925-9200
(303) 825-0902 Fax

August 31, 2018

Via Certified Mail: 7010 2780 0001 4763 3016
Washington County Commissioners
Courthouse Square
100 West Beau Street
Suite 702
Washington, PA 15301

Re: MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station – Application for State Only Operating Permit

Dear Commissioners:

This letter is being sent to notify the County Commisioners that MarkWest Liberty Midstream and Resources, L.L.C. (MarkWest) has applied to the Pennsylvania Department of Environmental Protection (PADEP) for a State Only Operating Permit (SOOP) for the Smith Compressor Station (Facility). The Facility currently operates under Plan Approval 63-00968A, which is due to expire on October 28, 2018 and will be renewed prior to that date. No modifications to equipment are proposed at this time. Equipment currently operating at the Facility includes eight (8) 1,980-hp Waukesha P9390GSI engines, two (2) 1,480-hp Waukesha L7042GSI engines, one (1) 130 mmscf/d glycol dehydration unit, one (1) 2.0 mmbtu/hr reboiler, one (1) 500-bbl gunbarrel tank, four (4) 400-bbl condensate and produced water storage tanks, and one flare.

The Facility is located at 320 Point Pleasant Road, Burgettstown, PA. 15021 in Smith Township, Washington County, PA.

This notice is being provided in accordance with the Municipal Notification requirements in General Plan Approval and/or General Operating Permit (BAQ-GPA/GP-5), Section A. General Conditions.

Anyone wishing to view this application may do so by making arrangements with:

Air Quality Program
PADEP - Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA. 15222
(412) 442-4000

Nathan Wheldon 15th floor

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Washington County Commissioners
Courthouse Square
100 West Beau Street
Suite 702
Washington, PA 15301

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7010 2780 0001 4763 3047

PS Form 3811, July 2013 Domestic Return Receipt

Nathan Wheldon 15th floor

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Smith Township
PO Box 94
Slovan, PA 15078

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7010 2780 0001 4763 3054

Section 4
Compliance Review Form

2700-PM-AQ0004 Rev. 6/2006

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

Fully and accurately provide the following information, as specified. Attach additional sheets as necessary.

Type of Compliance Review Form Submittal (check all that apply)

☐ Original Filing
☒ Amended Filing

Date of Last Compliance Review Form Filing: January 2018

Type of Submittal

☐ New Plan Approval
☒ Extension of Plan Approval
☐ Other: _____
☐ New Operating Permit
☐ Change of Ownership
☐ Renewal of Operating Permit
☐ Periodic Submission (@ 6 mos)

SECTION A. GENERAL APPLICATION INFORMATION

Name of Applicant/Permittee/("applicant")
(non-corporations-attach documentation of legal name)
MarkWest Liberty Midstream and Resources, L.L.C.

Address 1515 Arapahoe Street, Tower 1, Suite 1600
Denver, CO. 80202-2137

Telephone (303) 925-9200 **Taxpayer ID#** 30-0528059

Permit, Plan Approval or Application ID#

Identify the form of management under which the applicant conducts its business (check appropriate box)

☐ Individual
☐ Municipality
☐ Proprietorship
☒ Public Corporation
☐ Private Corporation
☐ Syndicate
☐ Municipal Authority
☐ Fictitious Name
☐ Partnership
☐ Limited Partnership
☐ Government Agency
☐ Joint Venture
☐ Association
☐ Other Type of Business, specify below:

Describe below the type(s) of business activities performed.

MarkWest Liberty Midstream and Resources, L.L.C. is a natural gas gathering and processing company.

SECTION B. GENERAL INFORMATION REGARDING "APPLICANT"

If applicant is a corporation or a division or other unit of a corporation, provide the names, principal places of business, state of incorporation, and taxpayer ID numbers of all domestic and foreign parent corporations (including the ultimate parent corporation), and all domestic and foreign subsidiary corporations of the ultimate parent corporation with operations in Pennsylvania. Please include all corporate divisions or units, (whether incorporated or unincorporated) and privately held corporations. (A diagram of corporate relationships may be provided to illustrate corporate relationships.) Attach additional sheets as necessary.

Unit Name	Principal Places of Business	State of Incorporation	Taxpayer ID	Relationship to Applicant
No changes				

SECTION C. SPECIFIC INFORMATION REGARDING APPLICANT AND ITS "RELATED PARTIES"

Pennsylvania Facilities. List the name and location (mailing address, municipality, county), telephone number, and relationship to applicant (parent, subsidiary or general partner) of applicant and all Related Parties' places of business, and facilities in Pennsylvania. Attach additional sheets as necessary.

Unit Name	Street Address	County and Municipality	Telephone No.	Relationship to Applicant
No changes				

Provide the names and business addresses of all general partners of the applicant and parent and subsidiary corporations, if any.

Name	Business Address
MPLX, LP	200 E. Hardin Street, Findlay, OH 45840
MarkWest Energy Partners, L.P.	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016
MarkWest Liberty M&R, L.L.C.	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016
MarkWest Liberty Bluestone, L.L.C.	440 Hartmann Road, Evans City, PA. 16033

List the names and business address of persons with overall management responsibility for the process being permitted (i.e. plant manager).

Name	Business Address
Bill Uhl, General Manager	4600 J. Barry Ct., Canonsburg, PA. 15317
Brian Rayburn, VP –Pipeline and Compression	4600 J. Barry Ct., Canonsburg, PA. 15317
Greg Bezdek, Sr. VP NEBU	4600 J. Barry Ct., Canonsburg, PA. 15317
Greg Floerke, Executive VP and COO	1515 Arapahoe St, Tower 1, Suite 1600, Denver, CO. 80016

Plan Approvals or Operating Permits. List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time 5 years prior to the date on which this form is notarized. This list shall include the plan approval and operating permit numbers, locations, issuance and expiration dates. Attach additional sheets as necessary.

Air Contamination Source	Plan Approval/ Operating Permit#	Location	Issuance Date	Expiration Date
Houston Gas Plant	PA-63-00936F	800 Western Ave	10/4/2012	11/2018
Baker CS	GP5-63-00960B	151 Baker Station Road	12/12/2011	12/12/2016 (Renewal Submitted 11/8/2016)
Brigich CS	GP5-63-00954C	340 Brigich Road	10/7/2010	10/7/2015 (Renewal Submitted 9/2/2015)
Carpenter CS	GP5-63-00987	265 Old National Pike	3/31/2014	3/31/2019
Down Homes CS	GP5-63-1009A	2037 Sunnyhill Road	5/16/2017	5/16/2022
Dryer CS	GP5-63-00942C	819 Scenic Drive	5/16/2016	5/16/2021
Fulton CS	GP5-63-00937D	103 Washington Ave	3/1/2012	3/1/2017 (Modification submitted 2/17/2017)
Godwin CS	GP5-63-00934C	2158 Henderson Ave	8/11/2016	8/11/2016 (Renewal submitted 7/8/2016)
Harmon Creek Gas Plant	GP1-63-01011A GP5-63-01011A	Smith Township	1/17/2018	1/17/2023
Hoskins CS	GP5-63-00938B	4026 Buffalo Creek Road	6/21/2011	6/21/2016 (Renewal submitted 5/19/2016)
Imperial-Cibus Ranch CS	GP5-63-00992	2213 Quiksilver Rd. 2199 Quiksilver Rd.	12/30/2015	12/30/2020
Johnston CS	GP5-63-00933D	210 Johnston Hill Road	7/22/2011	7/22/2016 (Renewal Submitted 6/20/2016)
Lowry CS	GP5-63-00947B	100 Oakleaf Rd	12/2/2011	12/2/2016 (Modification submitted 1/12/2016)
Redd CS	GP5-63-00962	576 Redd Run Rd.	5/18/2011	5/18/2016 (Renewal Submitted 4/14/2016)
Shaw CS	GP5-63-00940C	492 Arden Mine Rd	8/18/2011	8/18/2016 (Renewal Submitted 1/25/2016)

Smith CS	GP5-63-00968 PA-63-00968A	320 Point Pleasant Rd	7/11/2013 (PA)	10/28/2016 (PA) GP-5 Submitted 1/21/2016
Stewart CS	GP5-63-00939C	185 Avella Road	5/16/2016	5/16/2021
Three Brothers CS	GP5-63-00969 & Plan Approval 63-00969A	858 Atlasburg Road	12/30/2011 (GP5) 8/27/2012 (PA)	12/30/2016 (GP5) 11/2/2015 (PA) (Extension submitted 10/15/2015)
Tupta Day CS	GP5-63-00948C	200 Johnson Rd	1/31/2012	1/31/2017 (Renewal Submitted 1/12/2017)
Welling CS	GP5-00958A	165 Carlisle Rd	1/30/2015	1/30/2020
Sarsen Gas Plant	SOOP 10-00359	774 Prospect Rd.	12/03/2013	11/30/2018
Voll CS	GP5-10-367C	Off of Woodlands Rd, between Club House Dr and Prospect Rd	5/13/2014	4/30/2019
Trilith CS	GP5-10-370D	Southeast of intersection of Highway 79 an E Lancaster Rd	1/24/2014	12/31/2018
Royal Oak CS	GP5-10-390A	961 Brownsdale Rd	2/4/2014	1/31/2019
Bluestone Gas Plant	SOOP-10-368 PA-10-368F	440 Hartmann Rd.	11/6/2013 1/22/2018	10/31/2018 1/22/2023

Compliance Background. (Note: Copies of specific documents, if applicable, must be made available to the Department upon its request.) List all documented conduct of violations or enforcement actions identified by the Department pursuant to the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. Attach additional sheets as necessary. See the definition of "documented conduct" for further clarification. Unless specifically directed by the Department, deviations which have been previously reported to the Department in writing, relating to monitoring and reporting, need not be reported.

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status: Litigation Existing/Continuing or Corrected/Date	Dollar Amount Penalty
No change						$
						$
						$
						$
						$
						$
						$

List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Litigation Existing/Continuing Or Corrected/Date
July 6, 2015	Various	--	Pig Launcher/Receiver Permitting	Ongoing consent order negotiations with USEPA.
2016	Houston Plant and Other Gas Plants	PA-63-00936F	LDAR	Ongoing consent order negotiations with USEPA.

<u>CONTINUING OBLIGATION</u>. Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional deviations occur between the date of submission and Department action on the application.

VERIFICATION STATEMENT	
Subject to the penalties of Title 18 Pa.C.S. Section 4904 and 35 P.S. Section 4009(b)(2), I verify under penalty of law that I am authorized to make this verification on behalf of the Applicant/Permittee. I further verify that the information contained in this Compliance Review Form is true and complete to the best of my belief formed after reasonable inquiry. I further verify that reasonable procedures are in place to ensure that "documented conduct" and "deviations" as defined in 25 Pa Code Section 121.1 are identified and included in the information set forth in this Compliance Review Form.	
Signature	Date
Leanne Meyer Name (Print or Type)	
VP Corporate of HES Title	

Section 5
SOOP Application

2700-PM-AQ0013 Rev. 8/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

STATE-ONLY PERMIT APPLICATION

FOR OFFICIAL USE ONLY
State-Only OP Number:
Reviewed by:
Date:
Comments:

Section 1 - General Information

1.1 Application Type

Type of permit for which application is made: (Check one)

- ☒ Initial
- ☐ Renewal Operating Permit No. _____
- ☐ Application Revision

1.2 Plant Information

Federal Tax ID: 30-0528059 Firm Name: MarkWest Liberty Midstream & Resources, L.L.C.

Plant Code: _____ Plant Name: Smith Compressor Station

NAICS Code: 211111 SIC Code: 1311

Description of NAICS Code: Natural Gas Liquid Extraction

Description of SIC Code: Natural Gas Liquids

County: Washington Municipality Smith Township

Latitude: 40° 25' 04" Longitude: 80° 21' 24"

Horizontal Reference Datum: NAD 83 Horizontal Collection Method: _____ Reference Point: TOPO

1.3 Contact Information

Name: Nathan Wheldon Title: Sr. Manager – Air Projects

Address: 1515 Arapahoe Street Tower 1 Suite 1600
Denver, CO 80202-2137

Telephone Number: (303) 543-0686

Email Address: nwheldon@markwest.com

1.4 Certification of Truth, Accuracy and Completeness

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete.

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete.

(Signed) _____ Date: _____

Name (Typed): Leanne Meyer Title: VP Corporate HES

Please read instructions carefully before completing this application.

Section 2 - Site Information

2.1 Potential Emission Estimates for the Site

Provide the estimated potential emission for the site BEFORE and AFTER utilizing the proposed restriction(s) and/or limitation(s).

Pollutant or CAS No.	Potential Emission BEFORE taking Limitations (TPY)	Potential Emission AFTER taking Limitations (TPY)
NOx	40.78	40.78
CO	54.86	54.86
VOC	47.62	47.62
PM	6.78	6.78
HAPs	12.44	12.44
$CO_{2(e)}$	90,491.56	90,491.56
Benzene	1.18	1.18
Toluene	2.38	2.38
Ethylbenzene	0.02	0.02
Xylenes	0.15	0.15
N-hexane	0.66	0.66
Formaldehyde	1.87	1.87

*** Provide all supporting calculation methods as an attachment at the end of this application.**

2.2 Facility Type

Is this facility a Synthetic Minor Facility? Yes ☐ No ☒

If yes, go to Section 2.3, "Synthetic Minor Facility".

If no, go to Section 3, "Site Inventory".

IMPORTANT: Note that all Synthetic Minor Facilities must be able to meet the proposed restriction(s) and/or limitation(s) immediately upon the submission of this application. By signing the Certification of Compliance in Section 13 of this application, the facility for which a Synthetic Minor Status is proposed will be deemed a Synthetic Minor Facility according to the restriction(s) and/or limitation(s) proposed upon receipt of the application by the Department, unless the Department determines that the facility is unable to meet the Synthetic Minor requirements at a later date.

Please read instructions carefully before completing this application.

2.3 Synthetic Minor Facility Information (to be completed by all facilities seeking Synthetic Minor Status)

Synthetic Minor Status for this facility can be taken at the: Source Level ☐ AND/OR Site Level ☐

If limitation(s) and/or restriction(s) can be taken at the site level (for all sources within this facility), complete the following questions, otherwise please go on to Section 3, "Site Inventory".

Synthetic Minor Status for the Entire Site is achievable through the following restrictions: (Please check all that apply and describe in detail what is/are proposed):

☐	Hours of Operation	
☐	Production/Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitiations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor: **The facility is a natural minor source**

Note: If Section 2.3 is completed and there are no additional restrictions proposed at the source level, the applicant can omit Subsections 5, 6, and 7 in Sections 5, 6, and 7 for all sources in this permit application.

2.4 Compliance Method for the Site (for Synthetic Minor Facilities only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 2.3.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s) listed in Section 2.3:

b. Describe what is to be reported in the compliance report:

c. Reporting start date:

d. Indicate the frequency for submitting compliance report as explained above:

Please read instructions carefully before completing this application.

Section 3 - Site Inventory

List all air pollution sources, control equipment, emission points and fuel material locations at this site. Duplicate this page as necessary. For renewals, only list sources not included in current permit.

Unit ID No.	Company Designation	Unit Type
	Plant Sources	
101	*Waukesha L7042GSI*	*combustion*
102	*Waukesha L7042GSI*	*combustion*
103	*Waukesha P9390GSI*	*combustion*
104	*Waukesha P9390GSI*	*combustion*
105	*Waukesha P9390GSI*	*combustion*
106	*Waukesha P9390GSI*	*combustion*
107	*Waukesha P9390GSI*	*combustion*
108	*Waukesha P9390GSI*	*combustion*
109	*Waukesha P9390GSI*	*combustion*
110	*Waukesha P9390GSI*	*combustion*
201	*Dehydration Unit*	*process*
202	*Dehydration Unit Reboiler*	*combustion*
301	*Storage Tanks*	*process*
302	*Truck Loadout*	*process*
401	*Fugitive Component Emissions*	*process*
402	*Blowdown Emissions*	*process*
403	*Pigging Emissions*	*process*
404	*Crankcase Vents*	*process*
	Control Devices	
C2O1	*Dehydration Flare*	*control*
C301	*VRU*	*control*
	Combustion Source Stacks	
S101	*Waukesha L7042GSI Stack*	*exhaust*
S102	*Waukesha L7042GSI Stack*	*exhaust*
S103	*Waukesha P9390GSI Stack*	*exhaust*
S104	*Waukesha P9390GSI Stack*	*exhaust*
S105	*Waukesha P9390GSI Stack*	*exhaust*
S106	*Waukesha P9390GSI Stack*	*exhaust*
S107	*Waukesha P9390GSI Stack*	*exhaust*
S108	*Waukesha P9390GSI Stack*	*exhaust*

Please read instructions carefully before completing this application.

S109	*Waukesha P9390GSI Stack*	*exhaust*
S110	*Waukesha P9390GSI Stack*	*exhaust*
S202	*Dehydration Reboiler Vent Stack*	*exhaust*
	Flare Stacks	
SC1O1	*Dehydration Flare*	*exhaust*

Section 4 - Source Group (Optional)

4.1 Source Group Definition

This section applies to new State-Only Operating Permit applications only.

Define groups of source(s) that are subject to one or more applicable requirements that apply to all source(s) in the group.

Group No.	Source ID (for source(s) in this group)
Group #1 Gas-Fired Rich-Burn Engines	101, 102, 103, 104, 105, 106, 107, 108, 109, 110

4.2 Applicable Requirements for Source Groups

For renewals, only list group level requirements not included in the current State-Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State-Only Operating Permit.

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group Number	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 101, 102 b. Company Designation: Unit #1, #2

c. Plan Approval or Operating Permit Number: GP5-63-00968A

d. Manufacturer: Waukesha e. Model Number: L7042GSI

f. Source Description: Rich-Burn Natural Gas-Fired Engine

g. Rated Heat Input/Thruput: 1,480 HP h. Installation Date: 2/20/2013

i. Exhaust Temperature: 1126 Units: F j. Exhaust % Moisture: 5 k. Exhaust Flow Volume: ~2250 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
101, 102	Combustion Unit	S101, S102	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		11.39 mmbtu/hr	

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		negligible	negligible	1,277 btu/scf (HHV)

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 103, 104, 105, 106, 107, 108, 109, 110 b. Company Designation: Unit #3, #4, #5, #6, #7, #8, #9, #10

c. Plan Approval or Operating Permit Number: PA-63-00968A

d. Manufacturer: Waukesha e. Model Number: P9390GSI

f. Source Description: Rich-Burn Natural Gas-Fired Engine

g. Rated Heat Input/Thruput: 1,980 HP h. Installation Dates: 6/24/2014, 6/24/2014, 7/14/2014, 7/21/2014, 7/22/2014, 7/28/2014, 8/4/2014, 8/11/2014

i. Exhaust Temperature: 1177 Units: F j. Exhaust % Moisture: 5 k. Exhaust Flow Volume: ~3047 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
103-110	Combustion Unit	103-110	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		15.43 mmbtu/hr	

Please read instructions carefully before completing this application.

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		negligible	negligible	1,277 btu/scf (HHV)

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: 202 b. Company Designation: Dehydration Reboiler

c. Plan Approval or Operating Permit Number: GP5-63-00968A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Dehydration Reboiler

g. Rated Heat Input/Thruput: 2.0 mmbtu/hr. h. Installation Date: 2/20/2013

i. Exhaust Temperature: ~400 Units: F j. Exhaust % Moisture: 5 k. Exhaust Flow Volume: ~200 SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
202	Dehydration Reboiler	S202	Stack	100

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence
Natural Gas		2.0 mmbtu/hr	

Please read instructions carefully before completing this application.

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)
Natural Gas		Neg.	Neg.	1,277 Btu/cf

*FML = Fuel Material Location

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: not applicable

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 6 - Incinerator Operational Inventory

(Complete this section for each incinerator at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

6.1 General Source Information

a. Unit ID: none b. Company Designation: _____

c. Plan Approval or Operating Permit Number: _____

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: _____

g. Rated Heat Input/Thruput: _____ h. Installation Date: _____

i. Exhaust Temperature: _____ Units: _____ j. Exhaust % Moisture: _____ k. Exhaust Flow Volume: _____ SCFM

l. Inc. Capacity: _____ Lbs/Hr m. Primary Burner Heat Input: Units:

n. Exhaust % CO_2: _____ o. Secondary Burner Heat Input: _____ Units: _____

p. Incinerator Class: _____

q. Waste Type: _____ r. Waste BTU/lb: _____

6.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow

6.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

6.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

6.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

6.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 6.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

6.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 6.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

6.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 201 b. Company Designation: Dehydration Unit

c. Plan Approval or Operating Permit Number: PA-63-00968A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Dehydration Unit

g. Rated Heat Input/Thruput: 130 mmscf/d h. Installation Date: 2/20/2013

i. Exhaust Temperature: amb. Units: F j. Exhaust % Moisture: k. Exhaust Flow Volume: na SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
201	Dehydration Unit	C201	Dehydration Flare	100
C101	Dehydration Flare	SC201	Dehydration Flare Stack	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 301 b. Company Designation: Storage Tanks

c. Plan Approval or Operating Permit Number: GP5-63-00968A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Storage Tanks

g. Rated Heat Input/Thruput: 400 bbl h. Installation Date: 2/20/2013

i. Exhaust Temperature: Units: F j. Exhaust % Moisture: k. Exhaust Flow Volume: na

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
301	Storage Tanks	VRU	C301	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 302 b. Company Designation: Truck Load Out Operation

c. Plan Approval or Operating Permit Number: GP5-63-00968A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Truck Load Out

g. Rated Heat Input/Thruput: 545,906 gal/yr h. Installation Date: 2/20/2013

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
302	Truck Loadout	ATM	Atmosphere	100%

*Air Defender passes oxygen and nitrogen to atmosphere, hydrocarbons returned to tanks.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 401 b. Company Designation: Fugitive Emissions

c. Plan Approval or Operating Permit Number: PA-63-00968A

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Fugitives

g. Rated Heat Input/Thruput: _____ h. Installation Date: 2/20/2013-8/11/2014

i. Exhaust Temperature: Amb. Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
401	Fugitves	ATM	Atmosphere	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 402 b. Company Designation: Facility Blowdowns

c. Plan Approval or Operating Permit Number:

d. Manufacturer: e. Model Number:

f. Source Description: Blowdowns

g. Rated Heat Input/Thruput: h. Installation Date: 2/20/2013-8/11/2014

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
402	Blowdowns	ATM	Atmosphere	100*

*Blowdowns of engines are first routed to inlet to reduce the pressure, any remaining pressure requiring blowdown goes to the atmosphere.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 403 b. Company Designation: Pigging Emissions

c. Plan Approval or Operating Permit Number: _____

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: Pigging Emissions

g. Rated Heat Input/Thruput: _____ h. Installation Date: _____

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
403	Pigging Emissions	ATM	Atmosphere	100*

* Pigging Emissions are first blown to a lower pressure line to reduce pressure and then released to atmosphere.

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☒ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 404 b. Company Designation: Crankcase Vents

c. Plan Approval or Operating Permit Number:

d. Manufacturer: Waukesha e. Model Number: L7042GSI-P9390GSI

f. Source Description: Crankcase Vents

g. Rated Heat Input/Thruput: h. Installation Date: 2/20/2013-8/11/2014

i. Exhaust Temperature: Units: j. Exhaust % Moisture: k. Exhaust Flow Volume: SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
101-110	Crankcase Vents	Atm	Atmosphere	100

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

Please read instructions carefully before completing this application.

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

_____

_____

b. Describe what is to be reported in the compliance report:

_____

_____

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Please read instructions carefully before completing this application.

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C201 b. Company Designation: Dehydration Flare

c. Used by Sources: 201

d. Type: Flare Industries

e. Pressure Drop in H_2O: _____ f. Capture Efficiency: 100

g. Scrubber Flow Rate (GPM): _____

h. Manufacturer: Jordan i. Model Number: _____

j. Installation Date: 10/12/2012

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
VOCs		98+	testing

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: C301 b. Company Designation: VRU

c. Used by Sources: 301, 302

d. Type:

e. Pressure Drop in H_2O: f. Capture Efficiency: 100

g. Scrubber Flow Rate (GPM):

h. Manufacturer: i. Model Number:

j. Installation Date: 2/20/2013

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
VOCs		98+	Mfg.

Section 9 – Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S101, S102 b. Company Designation: Waukesha L7042GSI Stack

c. Discharge Type: Vertical Stack

d. Diameter (ft): 1.0 Height (ft): ~30 Base Elevation (ft): Approx. 1200

e. Exhaust Temperature: 820 Exhaust % Moisture: 5 Exhaust Velocity: 47.8 fps

f. Exhaust Volume: 2250 ACFM Exhaust Volume: 914 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 101, 102

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

a. Unit ID: S103-S110 b. Company Designation: Waukesha P9390GSI Stack

c. Discharge Type: Vertical Stack

d. Diameter (ft): 1.58 Height (ft): ~30 Base Elevation (ft): Approx. 1200

e. Exhaust Temperature: 840 Exhaust % Moisture: 5 Exhaust Velocity: 25.9 fps

f. Exhaust Volume: 3047 ACFM Exhaust Volume: 1,219 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 034

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"
Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

Please read instructions carefully before completing this application.

Section 9 – Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S202 b. Company Designation: Dehydration Reboiler Stack

c. Discharge Type: vertical

d. Diameter (ft): ~0.5 Height (ft): ~15 Base Elevation (ft): Approx.. 1200

e. Exhaust Temperature: ~500 Exhaust % Moisture: 5 Exhaust Velocity: >15.8 fps

f. Exhaust Volume: 746 ACFM Exhaust Volume: 403 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 202

j. Latitude: 40° 19' 54" Longitude: 80° 22' 43"

Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

a. Unit ID: SC201 b. Company Designation: Dehydration Flare Stack

c. Discharge Type: vertical

d. Diameter (ft): 6.0 Height (ft): 15 Base Elevation (ft): Approx.. 1200

e. Exhaust Temperature: ~800 Exhaust % Moisture: 5 Exhaust Velocity: ~0.60 fps

f. Exhaust Volume: ~1,013 ACFM Exhaust Volume: ~370 SCFM

g. Distance to Nearest Property Line (ft): See topo

h. Weather Cap?: ☐ Yes ☒ No

i. Used by Sources: 036

j. Latitude: 40 15 47 Longitude: 80 15 14

Horizontal Reference Datum: NAD 83 Horizontal Collection Method: Topo Reference Point:

Section 10 – Fuel Material Location (FML) Information (Optional)

For renewals, review and correct any pre-printed information and add additional sections for any new FML listed in Section 3 of this application.

10.1 Fuel Material Location Information

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: % Sulfur: BTU Content: Units:

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

Please read instructions carefully before completing this application.

Section 11 – Alternative Operating Scenario (optional)

(Duplicate this section for each source participated in this alternative scenarios)

11.1 General Information

a. Alternative Operating Scenario Name or ID No.: No alternate operating scenarios

b. Source ID No.: _____ c. Source Name: _____

d. Source Type (check one): ☐ Combustion ☐ Incinerator ☐ Process

e. Give a brief description of this alternative scenario stating how it is different from the standard operation:

11.2 Operational Flexibility Request

Check all that apply.

☐ Alternative exhaust system component configuration.
If this box is checked, complete Sections 11.3 and 11.7

☐ Alternative type of fuel replacing or in addition to an existing fuel in standard operation.
If this box is checked, complete Sections 11.4 and/or 11.5 and 11.7

☐ Alternative process method replacing or in addition to a process SCC existing in standard operation.
If this box is checked, complete Sections 11.6 and 11.7

☐ Alternative lower limitations.

11.3 Exhaust System Components

Specify the complete exhaust system component configuration for this alternative operating scenario.

From Component Type	From Component Number	To Component Type	To Component Number	Percent Flow	Begin Date	End Date

11.4 Source Classification Code (SCC) Listing for Alternative Operation

Give a complete listing of all fuels burned, products produced by a process or waste incinerated for this alternative operating scenario.

Fuel	Associated SCC	Max. Throughput Rate	Firing Sequence

11.5 Alternative Fuel Physical Characteristics

Give a complete listing of all fuels physical characteristics for this alternative operating scenario.

SCC/Fuel Burned	FML	% Sulfur	% Ash	BTU Content (Units)

11.6 Alternative Process/Product Description

a. Briefly describe the change(s) in raw materials and/or process methods used in this operating scenario, if applicable:

b. Provide and briefly describe the process SCC associated with this alternative operating scenario:

Process SCC:		SCC Description:	

c. Alternative Product(s):

Please read instructions carefully before completing this application.

11.7 Source Potential to Emit

Give Potential Emission estimate for all air pollutants emitted at this source for this operating scenario.

Pollutant or CAS Number	Fuel	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

Section 12 – Compliance Plan for the Facility

		Yes	No
12.1	Will your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements during the permit duration?	☒	☐
12.2	Will your facility be in compliance with all applicable requirements presently scheduled to take effect during the term of the permit?	☒	☐
12.3	Will these requirements be met by the regulatory required dates?	☒	☐

If you checked "NO" in part 12.1, 12.2 or 12.3, answer the following questions:

12.4 Identify applicable requirement(s) for which compliance is not or will not be achieved:

Source ID Number	Citation Number

12.4.1 Briefly describe how compliance with this/these applicable requirement(s) will be achieved:

12.4.2. Provide a detailed schedule of compliance for the non-complying sources or activities identified in this section of the application. Include an enforceable sequence of corrective actions with milestone and projected compliance dates.

Date	Action/Milestone

12.4.3. Indicate the submittal frequency for the progress report(s): _____

12.4.4. Starting date for the submittal of the progress report(s): _____

Section 13 – Certification of Compliance for Synthetic Minor Source

In order for this Synthetic Minor facility to avoid the State-Only Operating Permit requirements, the applicant must agree to be bound by the emissions limitation(s) and/or restriction(s) contained in this application. In addition, the applicant must agree that these emission limitation(s) are enforceable by the Department, the Environmental Protection Agency and the citizens.

13.1 Schedule for Compliance Certification Submission

a. Frequency of submittal: Facility is a natural source

b. Beginning date: _____

13.2 Certification of Compliance (for Synthetic Minor Facility only)

I certify under the penalty of 18 Pa. CS 4904 (b) (2) that the sources covered by this application will comply with the emission limitations and other requirements contained in this application and all previously issued plan approvals and operating permits. I further certify that, based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate, and complete.

(Signed) _____ Date _____

Name (Typed) _____

Title: _____

Addendum 1s'

Addendum 1s'
Group Level Requirements

2700-PM-AQ0016 11/2001

COMMONWEALTH OF PENSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

ADDENDUM 1
METHOD OF COMPLIANCE WORKSHEET

SECTION A. APPLICABLE REQUIREMENT

Federal Tax ID 30-0528059

Firm Name MarkWest Liberty Midstream & Resources, LLC

Plant Code

Plant Name Smith Compressor Station

Applicable Requirement for: (check only one)

☐ Entire Site

☒ Group of Sources — Group ID: Group #1 (Gas-Fired Rich-Burn Engines.)

☐ Single Source — Unit ID:

☐ Alternative Operating Scenario — Scenario Name:

Citation No. 40 CFR 60 NSPS Subpart JJJJ

Compliance Method Based Upon ☐ Applicable Requirement ☐ CAM ☐ Other

Method of Compliance Type: [check all that apply and complete all appropriate section(s)]

☒ Monitoring ☒ Testing ☒ Reporting

☒ Record Keeping ☐ Work Practice Standard

SECTION B. MONITORING

Monitoring Device Type (stack test, CEM, etc.) Stack Test

Monitoring Device Location

Describe all parameters being monitored along with the frequency and duration of monitoring each parameter.
NOx and CO will be tested quarterly to ensure within limits.

How will data be reported?

SECTION C. TESTING

Reference Test Method Description Annual test of NOx, CO, VOC to ensure within limits

Reference Test Method Citation 40 CFR 60 NSPS Subpart JJJJ

SECTION D. RECORD KEEPING

Describe what parameters will be recorded and the frequency of recording.
All maintenance events and results of stack monitoring and testing

SECTION E. REPORTING

Describe what is to be reported and the frequency of reporting.
Reports upon completion of testing as required in NSPS Subpart JJJJ and annual report as required by the Department stating overall compliance.

Reporting Start Date Upon issuance of permit

SECTION F. WORK PRACTICE STANDARD

Describe any work practice standard(s).

Addendum 1s'
Source Level Requirements

Section 6
Emission Estimates

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Summary of Potential Emissions

Criteria Pollutant Potential Emissions

Process/Facility	Potential Emissions (lb/hr)					
	NOx	CO	VOC[1]	SO_2	PM[2]	HAPs
Waukesha L7042GSI w/ NSCR	0.65	0.82	0.55	0.01	0.11	0.17
Waukesha L7042GSI w/ NSCR	0.65	0.82	0.55	0.01	0.11	0.17
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
Waukesha P9390GSI w/ NSCR	0.87	1.13	0.57	0.01	0.15	0.23
TEG Dehydration Unit	--	--	1.32	--	--	0.50
Dehydration Unit Reboiler	0.20	0.16	0.01	0.00	0.01	0.00
Flare	0.58	1.33	--	0.00	0.03	--
Tanks controlled by VRU	--	--	0.29	--	--	0.01
Fugitives	--	--	0.99	--	--	0.02
Crankcase Emissions	0.25	0.32	0.17	0.00	0.04	0.06
Site Wide Emissions (lb/hr)	**9.31**	**12.52**	**8.42**	**0.09**	**1.55**	**2.75**

[1] VOC as shown in this table includes formaldehyde.
[2] PM = PM_{10} = $PM_{2.5}$

Process/Facility	Potential Emissions (tpy)					
	NOx	CO	VOC[1]	SO_2	PM[2]	HAPs
Waukesha L7042GSI w/ NSCR	2.86	3.57	2.43	0.03	0.50	0.74
Waukesha L7042GSI w/ NSCR	2.86	3.57	2.43	0.03	0.50	0.74
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
Waukesha P9390GSI w/ NSCR	3.82	4.97	2.49	0.04	0.67	1.00
TEG Dehydration Unit	--	--	5.79	--	--	2.17
Dehydration Unit Reboiler	0.86	0.72	0.05	0.01	0.07	0.02
Flare	2.53	5.81	--	0.01	0.13	--
Tanks controlled by VRU	--	--	1.25	--	--	0.04
Condensate Loadout	--	--	0.02	--	--	0.00
Fugitives	--	--	4.32	--	--	0.10
Blowdowns	--	--	7.17	--	--	0.16
Pigging Operations	--	--	2.26	--	--	0.04
Crankcase Emissions	1.09	1.41	0.74	0.01	0.19	0.28
Site Wide Emissions (tpy)	**40.78**	**54.86**	**46.34**	**0.40**	**6.78**	**12.26**

[1] VOC as shown in this table includes formaldehyde.
[2] PM = PM_{10} = $PM_{2.5}$

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Summary of Potential Emissions

Hazardous Air Pollutant Potential Emissions

Process/Facility	HAPs - Potential Emissions (lb/hr)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
Waukesha L7042GSI w/ NSCR	1.79E-02	2.82E-04	6.34E-03	2.22E-03	--	3.26E-02
Waukesha L7042GSI w/ NSCR	1.79E-02	2.82E-04	6.34E-03	2.22E-03	--	3.26E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
Waukesha P9390GSI w/ NSCR	2.44E-02	3.83E-04	8.61E-03	3.01E-03	--	4.37E-02
TEG Dehydration Unit	1.09E-02	--	4.49E-01	--	4.60E-02	--
Dehydration Unit Reboiler	4.12E-06	--	6.67E-06	--	3.53E-03	1.47E-04
Flare	--	--	--	--	--	--
Tanks controlled by VRU	9.51E-03	7.56E-04	3.97E-03	7.11E-04	2.51E-02	--
Crankcase Emissions	6.93E-03	1.09E-04	2.45E-03	8.55E-04	--	1.24E-02
Site Wide Emissions (lb/hr)	**0.26**	**0.00**	**0.54**	**0.03**	**0.07**	**0.43**

Process/Facility	HAPs - Potential Emissions (tpy)					
	Benzene	Ethylbenzene	Toluene	Xylenes	n-Hexane	Formaldehyde
Waukesha L7042GSI w/ NSCR	7.86E-02	1.23E-03	2.78E-02	9.70E-03	--	1.43E-01
Waukesha L7042GSI w/ NSCR	7.86E-02	1.23E-03	2.78E-02	9.70E-03	--	1.43E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
Waukesha P9390GSI w/ NSCR	1.07E-01	1.68E-03	3.77E-02	1.32E-02	--	1.91E-01
TEG Dehydration Unit	4.78E-02	--	1.97E+00	--	2.02E-01	--
Dehydration Unit Reboiler	1.80E-05	--	2.92E-05	--	1.55E-02	6.44E-04
Flare	--	--	--	--	--	--
Tanks controlled by VRU	4.17E-02	3.31E-03	1.74E-02	3.11E-03	1.10E-01	--
Condensate Loadout	0.00E+00	0.00E+00	0.00E+00	3.60E-04	3.26E-04	--
Blowdowns	4.49E-03	0.00E+00	4.49E-03	1.35E-02	1.80E-01	--
Pigging Operations	9.85E-04	0.00E+00	9.85E-04	5.96E-03	3.94E-02	--
Crankcase Emissions	3.03E-02	4.76E-04	1.07E-02	3.74E-03	--	5.45E-02
Site Wide Emissions (tpy)	**1.14**	**0.02**	**2.36**	**0.15**	**0.55**	**1.87**

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Summary of Greenhouse Gas Emissions

GHG Potential To Emit

Process/Facility	GHG - Potential Emissions (tpy) in CO2(e)		
	CO_2	CH_4	N_2O
Reboiler	1,126.33	0.53	0.63
Flare Pilot + Purge Gas	2,264.01	1.07	1.27
Dehydrator Flare	1,597.25	89.93	--
(2) Waukesha L7042GSI w/ NSCR	12,794.00	6.03	7.19
(8) Waukesha P9390 w/ NSCR	69,508.90	32.77	39.07
Tanks controlled by VRU	--	7.93	--
Fugitives	--	211.81	--
Blowdowns	0.03	179.84	--
Pigging Operations (RFD)	--	143.13	--
Condensate Loadout		0.00	
Crankcase Emissions	2,469.09	1.16	1.39
Total	89,759.61	674.20	49.55

Total CO2(e) **90,483.37**

GHG Calculations
MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Fugitive GHG Calculation

Equipment type	Stream Type (Gas/Liquid etc)	Total CH4 Emissions (tpy)	CH_4 * Wt%	CO_2(e) from CH_4**
Connectors/Flanges	Natural Gas	1.9571	58.1%	48.9272
Connectors/Flanges	Light Oil	0.0000	58.1%	0.0000
Connectors/Flanges	Water/Light Oil	0.0103	58.1%	0.2574
Compressors	Natural Gas	0.1312	58.1%	3.2790
Open-Ended Lines	Natural Gas	0.0000	58.1%	0.0000
Pump Seals	Natural Gas	0.0000	58.1%	0.0000
Pump Seals	Light Oil	0.0000	58.1%	0.0000
Pump Seals	Water/Light Oil	0.0000	58.1%	0.0000
Valves	Natural Gas	6.3718	58.1%	159.2945
Valves	Light Oil	0.0000	58.1%	0.0000
Valves	Water/Light Oil	0.0020	58.1%	0.0489
CO2(e) from CH4				211.8070

*Taken from Gas Analysis and Condensate Analysis

** Global warming potential from 40 CFR 98, "2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determination for New or Substantially Revised Data Elemetns". Table 2 - GHGs with Revised GWPs for Table A-1.

Dehydrator GHG Calculation

Constituent	Uncontrolled Emission Rate (tpy)	Controlled Emission Rate (tpy)	Carbon from Combustion (tpy)	CO_2 Emissions (tpy)
Methane	179.8503	3.5970	131.8603	483.5977
Ethane	81.1771	1.6235	63.4947	232.8668
Propane	63.7997	1.2760	51.0398	187.1883
Isobutane	10.2908	0.2058	8.3290	30.5465
n-Butane	36.0202	0.7204	29.1533	106.9198
Isopentane	9.9075	0.1982	8.0743	29.6125
n-Pentane	16.9606	0.3392	13.8224	50.6935
n-Hexane	10.0847	0.2017	8.2569	30.2820
Cyclohexane	4.0183	0.0804	3.3690	12.3556
Other Hexanes	9.8402	0.1968	8.2501	30.2571
Heptanes	16.4420	0.3288	13.5067	49.5358
Xylenes	98.4201	1.9684	87.1880	319.7619
C8+ Heavies	11.1307	0.2226	9.1697	33.6298
Total CO2				1597.2473
CO2(e) from CH4				89.9252

GHG Calculations
MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Reboiler

Equipment	Heat Input (LHV) (mmbtu/hr)	Heat Input (HHV) (mmbtu/hr)	Emission Factors* CO2 (lb/mmbtu)	CH4 (lb/mmbtu)	N20 (lb/mmbtu)	CO2(e) CO2 Emission Rate (tpy)	CO2(e)** CH4 Emission Rate (tpy)	CO2(e)** N2O Emission Rate (tpy)
Reboiler	2.0000	2.2000	116.8879	0.0022	0.0002	1126.33	0.53	0.63
Flare Pilot + Purge Gas	4.0202	4.4222	116.8879	0.0022	0.0002	2264.01	1.07	1.27

* 40 CFR 98 Subpart C, Tables C-1 and C-2 for Natural Gas and converted to lb/mmbtu

** Global warming potential from 40 CFR 98, "2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determination for New or Substantially Revised Data Elemetns". Table 2 - GHGs with Revised GWPs for Table A-1.

Engines

Engine	HP	Fuel Use (LHV) (btu/bhp-hr)	Fuel Use (HHV) (btu/bhp-hr)	Fuel Use (HHV) (mmbtu/yr)	Emission Factors* CO2 (lb/mmbtu)	CH4 (lb/mmbtu)	N20 (lb/mmbtu)	CO2(e) CO2 Emission Rate (tpy)	CO2(e)** CH4 Emission Rate (tpy)	CO2(e)** N2O Emission Rate (tpy)
Wauk. L7042GSI	1,480	7675	8443	109455	116.8879	0.0022	0.0002	6397.00	3.02	3.60
Wauk. P9390GSI	1,980	7792	8571	148666	116.8879	0.0022	0.0002	8688.61	4.10	4.88

* 40 CFR 98 Subpart C, Tables C-1 and C-2 for Natural Gas and converted to lb/mmbtu

** Global warming potential from 40 CFR 98, "2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determination for New or Substantially Revised Data Elemetns". Table 2 - GHGs with Revised GWPs for Table A-1.

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Compressor Engine Emissions (Per Engine)

Source Designation:	
Manufacturer:	Waukesha
Model No.:	L7042GSI
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Field Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,277
Rated Horsepower (bhp):	1,480
Specific Fuel Consumption (Btu/bhp-hr)	7,675
Maximum Fuel Consumption at 100% Load (scf/hr):	8,892
Heat Input (MMBtu/hr)	11.36

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	77.89

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx (uncontrolled)	13.00	g/bhp-hr
NO_X	0.20	g/bhp-hr
CO (uncontrolled)	9.00	g/bhp-hr
CO	0.25	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
VOC (uncontrolled)*	0.39	g/bhp-hr
VOC	0.17	g/bhp-hr
NMNEHC (uncontrolled)	0.34	g/bhp-hr
NMNEHC	0.16	g/bhp-hr
Formaldehyde (HCHO) (uncontrolled)	0.05	g/bhp-hr
Formaldehyde (HCHO)	0.01	g/bhp-hr

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NOx (uncontrolled)	42.42	185.78
NO_X	0.65	2.86
CO (uncontrolled)	29.37	128.62
CO	0.82	3.57
SO_2	0.01	0.03
PM_{10} (Filterable)	0.001	0.00
$PM_{2.5}$ (Filterable)	0.001	0.00
PM Condensable	0.11	0.49
PM Total	0.11	0.50
VOC (uncontrolled)*	1.27	5.57
VOC	0.55	2.43
NMNEHC (uncontrolled)	1.11	4.86
NMNEHC	0.52	2.29
Formaldehyde (HCHO) (uncontrolled)	0.16	0.71
Formaldehyde (HCHO)	0.03	0.14

Hazardous Air Pollutant (HAP) Potential Emissions from Waukesha L7042 Engines

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	2.87E-04	1.26E-03
1,1,2-Trichloroethane	1.53E-05	1.74E-04	7.61E-04
1,3-Butadiene	6.63E-04	7.53E-03	3.30E-02
1,3-Dichloropropene	1.27E-05	1.44E-04	6.32E-04
Acetaldehyde	2.79E-03	3.17E-02	1.39E-01
Acrolein	2.63E-03	2.99E-02	1.31E-01
Benzene	1.58E-03	1.79E-02	7.86E-02
Carbon Tetrachloride	1.77E-05	2.01E-04	8.81E-04
Chlorobenzene	1.29E-05	1.47E-04	6.42E-04
Chloroform	1.37E-05	1.56E-04	6.82E-04
Ethylbenzene	2.48E-05	2.82E-04	1.23E-03
Ethylene Dibromide	2.13E-05	2.42E-04	1.06E-03
Methanol	3.06E-03	3.48E-02	1.52E-01
Methylene Chloride	4.12E-05	4.68E-04	2.05E-03
Naphthalene	9.71E-05	1.10E-03	4.83E-03
PAH	1.41E-04	1.60E-03	7.02E-03
Styrene	1.19E-05	1.35E-04	5.92E-04
Toluene	5.58E-04	6.34E-03	2.78E-02
Vinyl Chloride	7.18E-06	8.16E-05	3.57E-04
Xylene	1.95E-04	2.22E-03	9.70E-03
Total HAP (Includes Formaldehyde)	**1.47E-02**	**0.17**	**0.74**

[a] SO_2, PM, and HAP emission factors (excluding HCHO) from AP-42 Section 3.2, Table 3.2-3"Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines," Supplement F, July 2000. NO_X, VOC, CO, and formaldehyde emission factors are based on manufacturer's data.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Compressor Engine Emissions (Per Engine)

Source Designation:	
Manufacturer:	Waukesha
Model No.:	P9390GSI
Stroke Cycle:	4-stroke
Type of Burn:	Rich
Fuel Used:	Field Gas
Fuel High Heating Value (HHV) (Btu/scf):	1,277
Rated Horsepower (bhp):	1,980
Specific Fuel Consumption (Btu/bhp-hr)	7,792
Maximum Fuel Consumption at 100% Load (scf/hr):	12,077
Heat Input (MMBtu/hr)	15.43

Operational Details:

Potential Annual Hours of Operation (hr/yr):	8,760
Potential Fuel Consumption (MMscf/yr):	105.80

Criteria and Manufacturer Specific Pollutant Emission Factors:

Pollutant	Emission Factors[a]	Units
NOx (uncontrolled)	13.00	g/bhp-hr
NOx	0.20	g/bhp-hr
CO (uncontrolled)	9.00	g/bhp-hr
CO	0.26	g/bhp-hr
SO_2	5.88E-04	lb/MMBtu
PM_{10} (Filterable)	7.71E-05	lb/MMBtu
$PM_{2.5}$ (Filterable)	7.71E-05	lb/MMBtu
PM Condensable	9.91E-03	lb/MMBtu
PM Total	9.99E-03	lb/MMBtu
VOC (uncontrolled)*	0.35	g/bhp-hr
VOC	0.13	g/bhp-hr
NMNEHC (uncontrolled)	0.30	g/bhp-hr
NMNEHC	0.12	g/bhp-hr
Formaldehyde (HCHO) (uncontrolled)	0.05	g/bhp-hr
Formaldehyde (HCHO)	0.01	g/bhp-hr

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NOx (uncontrolled)	56.75	248.55
NOx	0.87	3.82
CO (uncontrolled)	39.29	172.07
CO	1.13	4.97
SO_2	0.01	0.04
PM_{10} (Filterable)	0.001	0.01
$PM_{2.5}$ (Filterable)	0.001	0.01
PM Condensable	0.15	0.67
PM Total	0.15	0.67
VOC (uncontrolled)*	1.53	6.69
VOC	0.57	2.49
NMNEHC (uncontrolled)	1.31	5.74
NMNEHC	0.52	2.29
Formaldehyde (HCHO) (uncontrolled)	0.22	0.96
Formaldehyde (HCHO)	0.04	0.19

Hazardous Air Pollutant (HAP) Potential Emissions from Waukesha P9390 Engines

Pollutant	Emission Factor (lb/MMBtu)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
HAPs:			
1,1,2,2-Tetrachloroethane	2.53E-05	3.90E-04	1.71E-03
1,1,2-Trichloroethane	1.53E-05	2.36E-04	1.03E-03
1,3-Butadiene	6.63E-04	1.02E-02	4.48E-02
1,3-Dichloropropene	1.27E-05	1.96E-04	8.58E-04
Acetaldehyde	2.79E-03	4.30E-02	1.89E-01
Acrolein	2.63E-03	4.06E-02	1.78E-01
Benzene	1.58E-03	2.44E-02	1.07E-01
Carbon Tetrachloride	1.77E-05	2.73E-04	1.20E-03
Chlorobenzene	1.29E-05	1.99E-04	8.72E-04
Chloroform	1.37E-05	2.11E-04	9.26E-04
Ethylbenzene	2.48E-05	3.83E-04	1.68E-03
Ethylene Dibromide	2.13E-05	3.29E-04	1.44E-03
Methanol	3.06E-03	4.72E-02	2.07E-01
Methylene Chloride	4.12E-05	6.36E-04	2.78E-03
Naphthalene	9.71E-05	1.50E-03	6.56E-03
PAH	1.41E-04	2.18E-03	9.53E-03
Styrene	1.19E-05	1.84E-04	8.04E-04
Toluene	5.58E-04	8.61E-03	3.77E-02
Vinyl Chloride	7.18E-06	1.11E-04	4.85E-04
Xylene	1.95E-04	3.01E-03	1.32E-02
Total HAP (Includes Formaldehyde)	**1.46E-02**	**0.23**	**1.00**

[a] SO_2, PM, and HAP emission factors (excluding HCHO) from AP-42 Section 3.2, Table 3.2-3"Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines," Supplement F, July 2000. NO_X, VOC, CO, and formaldehyde emission factors are based on manufacturer's data.

[b] Emission Rate (lb/hr) = Rated Capacity (MMBtu/hr or bhp) × Emission Factor (lb/MMBtu or lb/bhp-hr).

[c] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8,760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Glycol Dehydrator Emissions

GRI-GLYCalc Version 4.0 - EMISSIONS SUMMARY

EMISSION RATES

	Pre-Control Emissions			Post Control Emissions		
Pollutant	**(lbs/hr)**	**(lbs/day)**	**(tons/yr)**	**(lbs/hr)**	**(lbs/day)**	**(tons/yr)**
Methane	41.0617	985.4810	179.8503	0.8212	19.710	3.5970
Ethane	18.5336	444.8060	81.1771	0.3707	8.896	1.6235
Propane	14.5661	349.5870	63.7997	0.2913	6.992	1.2760
Isobutane	2.3495	56.3880	10.2908	0.0470	1.128	0.2058
n-Butane	8.2238	197.3710	36.0202	0.1645	3.947	0.7204
Isopentane	2.2620	54.2880	9.9075	0.0452	1.086	0.1982
n-Pentane	3.8723	92.9350	16.9606	0.0774	1.859	0.3392
n-Hexane	2.3024	55.2590	10.0847	0.0460	1.105	0.2017
Cyclohexane	0.9174	22.0180	4.0183	0.0183	0.440	0.0804
Other Hexanes	2.2466	53.9190	9.8402	0.0449	1.078	0.1968
Heptanes	3.7390	90.0930	16.4420	0.0748	1.802	0.3288
Benzene	0.5455	13.0920	2.3893	0.0109	0.262	0.0478
Toluene	22.4703	539.2880	98.4201	0.4494	10.786	1.9684
C8+ Heavies	2.5412	60.9900	11.1307	0.0508	1.220	0.2226
				0.0000		
Total Emissions	125.6314	3015.5150	550.3315	2.5126	60.3103	11.0066
Total VOC Emissions	66.0361	1585.2280	289.3041	1.3207	31.7046	5.7861
Total HAP Emissions	24.7727	594.5470	108.5048	0.4955	11.8909	2.1701

See attached GRI-GLYCalc run for more information

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Flare

Pilot Light + Purge Gas

Source Designation:	
Manufacturer:	SFI
Operating Hours: (hr/yr)	8,760
Pilot Gas Heat Input (MMBtu/hr)	4.02
Pilot Annual Fuel Use (mmscf/yr)	27.568
Pilot Fuel Consumption (mmscf/hr):	3.15E-03
Fuel HHV (Btu/scf)	1,277

Pollutant	AP-42 Emission Factor (lb/mmscf)[a]	Corrected Factor (lb/mmscf)[a]
NO_X	100	125.2
CO	84	105.2
SO_2	0.6	0.8
PM Total	7.6	9.5
PM Condensable	5.7	7.1
PM_{10} (Filterable)	1.9	2.4
$PM_{2.5}$ (Filterable)	1.9	2.4

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1 corrected for site-specific gas heat content.
[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[c] Annual Emissions $(tons/yr)_{Potential} = (lb/hr)_{Emissions} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

Combustion of Hydrocarbons

Source Designation:	
Dehydrator Emissions (lb/hr)	125.63
MW	30.45
Hourly Gas Flow (scf/hr)	1,564
Annual Gas Flow (mmscf/yr)	13.70
Heating value (btu/scf)	1,722.02
Maximum Heat Release of Flare (mmbtu/hr)	2.7
Maximum Heat Release of Flare (mmbtu/yr)	23,591
NO_X Emission Rate (lb/mmbtu)	0.068
CO Emission Rate (lb/mmbtu)	0.37

[a] Emission factors from AP-42 Section 13.5 "Industrial Flares" Table 13.5-1

Total Emissions

Pollutant	lb/hr	tpy
NO_X	0.5773	2.5284
CO	1.3275	5.8145
SO_2	0.0024	0.0104
PM Total	0.0300	0.1312
PM Condensable	0.0225	0.0984
PM_{10} (Filterable)	0.0075	0.0328
$PM_{2.5}$ (Filterable)	0.0075	0.0328

MarkWest Liberty Midstream and Resources, L.L.C.
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Dehydration Unit Reboiler

Source Designation:	
Fuel Used:	Field Gas
Higher Heating Value (HHV) (Btu/scf):	1,277
Heat Input (MMBtu/hr)	2.00
Fuel Consumption (mmscf/hr):	1.57E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions (lb/hr)[b]	Potential Emissions (tons/yr)[c]
NO_x	125.2	0.196	0.859
CO	105.2	0.165	0.721
SO_2	0.8	0.001	0.005
PM Total	9.5	0.015	0.065
PM Condensable	7.1	0.011	0.049
PM_{10} (Filterable)	2.4	0.004	0.016
$PM_{2.5}$ (Filterable)	2.4	0.004	0.016
VOC	6.9	0.011	0.047

Hazardous Air Pollutant (HAP) Potential Emissions from Dehy Reboiler

Pollutant	Emission Factor (lb/MMscf)[a]	Potential Emissions	
		(lb/hr)[b]	(tons/yr)[c]
HAPs:			
3-Methylchloranthrene	2.25E-06	3.53E-09	1.55E-08
7,12-Dimethylbenz(a)anthracene	2.00E-05	3.14E-08	1.37E-07
Acenaphthene	2.25E-06	3.53E-09	1.55E-08
Acenaphthylene	2.25E-06	3.53E-09	1.55E-08
Anthracene	3.01E-06	4.71E-09	2.06E-08
Benz(a)anthracene	2.25E-06	3.53E-09	1.55E-08
Benzene	2.63E-03	4.12E-06	1.80E-05
Benzo(a)pyrene	1.50E-06	2.35E-09	1.03E-08
Benzo(b)fluoranthene	2.25E-06	3.53E-09	1.55E-08
Benzo(g,h,i)perylene	1.50E-06	2.35E-09	1.03E-08
Benzo(k)fluoranthene	2.25E-06	3.53E-09	1.55E-08
Chrysene	2.25E-06	3.53E-09	1.55E-08
Dibenzo(a,h) anthracene	1.50E-06	2.35E-09	1.03E-08
Dichlorobenzene	1.50E-03	2.35E-06	1.03E-05
Fluoranthene	3.76E-06	5.88E-09	2.58E-08
Fluorene	3.51E-06	5.49E-09	2.40E-08
Formaldehyde	9.39E-02	1.47E-04	6.44E-04
Hexane	2.25E+00	3.53E-03	1.55E-02
Indo(1,2,3-cd)pyrene	2.25E-06	3.53E-09	1.55E-08
Phenanthrene	2.13E-05	3.33E-08	1.46E-07
Pyrene	6.26E-06	9.80E-09	4.29E-08
Toluene	4.26E-03	6.67E-06	2.92E-05
Arsenic	2.50E-04	3.92E-07	1.72E-06
Beryllium	1.50E-05	2.35E-08	1.03E-07
Cadmium	1.38E-03	2.16E-06	9.45E-06
Chromium	1.75E-03	2.75E-06	1.20E-05
Cobalt	1.05E-04	1.65E-07	7.21E-07
Lead	6.26E-04	9.80E-07	4.29E-06
Manganese	4.76E-04	7.45E-07	3.26E-06
Mercury	3.26E-04	5.10E-07	2.23E-06
Nickel	2.63E-03	4.12E-06	1.80E-05
Selenium	3.01E-05	4.71E-08	2.06E-07
Polycyclic Organic Matter:			
Methylnaphthalene (2-)	2.40E-05	3.76E-08	1.65E-07
Naphthalene	6.10E-04	9.55E-07	4.18E-06
Total HAP		**3.70E-03**	**1.62E-02**

[a] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3 (07/98) for all criteria and HAP pollutants, corrected to site-specific gas heat content.

[b] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[c] Annual Emissions $(\text{tons/yr})_{\text{Potential}} = (\text{lb/hr})_{\text{Emissions}} \times$ (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Condensate Tanks - Controlled by VRU

Control Percentage	98%
Component	Gasoline (RVP 15)

Source	2 x 400 bbl Condensate Tanks Annual Losses (lbs) - Controlled	
	Per Tank	Total
Working Loss	2117.13	4234.26
Breathing Loss	1525.65	3051.30
Total Emissions	3642.78	7285.56

Condensate Throughput	
(bbl/day)	gal/yr/tank
35.61	272,953

Component	Mass % in NGL	Flash Emissions				W&B Emissions				Total Emissions			
		Total Uncontrolled Emissions		Total Controlled Emissions		Total Uncontrolled Emissions		Total Controlled Emissions		Total Uncontrolled Emissions		Total Controlled Emissions	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Nitrogen	0.06%	0.0134	0.06	0.00	0.00	0.0008	0.00	0.00	0.00	0.0142	0.06	0.00	0.00
Methane	15.38%	3.4111	14.94	0.07	0.30	0.2104	0.92	0.00	0.02	3.6215	15.86	0.07	0.32
CO_2	0.12%	0.0273	0.12	0.00	0.00	0.0016	0.01	0.00	0.00	0.0289	0.13	0.00	0.00
Ethane	21.85%	4.8452	21.22	0.10	0.42	0.2989	1.31	0.01	0.03	5.1441	22.53	0.10	0.45
Propane	25.65%	5.6880	24.91	0.11	0.50	0.3509	1.54	0.01	0.03	6.0389	26.45	0.12	0.53
i-Butane	4.98%	1.1035	4.83	0.02	0.10	0.0681	0.30	0.00	0.01	1.1716	5.13	0.02	0.10
n-Butane	14.61%	3.2405	14.19	0.06	0.28	0.1999	0.88	0.00	0.02	3.4404	15.07	0.07	0.30
i-Pentane	3.85%	0.8538	3.74	0.02	0.07	0.0527	0.23	0.00	0.00	0.9065	3.97	0.02	0.08
n-Pentane	5.32%	1.1808	5.17	0.02	0.10	0.0728	0.32	0.00	0.01	1.2536	5.49	0.03	0.11
2-Methylpentane	2.02%	0.4480	1.96	0.01	0.04	0.0276	0.12	0.00	0.00	0.4756	2.08	0.01	0.04
n-Hexane	1.63%	0.3611	1.58	0.01	0.03	0.0223	0.10	0.00	0.00	0.3834	1.68	0.01	0.03
Benzene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
Cyclohexane	0.16%	0.0362	0.16	0.00	0.00	0.0022	0.01	0.00	0.00	0.0384	0.17	0.00	0.00
2-Methylhexane	0.84%	0.1870	0.82	0.00	0.02	0.0115	0.05	0.00	0.00	0.1985	0.87	0.00	0.02
n-Heptane	0.32%	0.0717	0.31	0.00	0.01	0.0044	0.02	0.00	0.00	0.0761	0.33	0.00	0.01
Toluene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
2-Methylheptane	0.16%	0.0356	0.16	0.00	0.00	0.0022	0.01	0.00	0.00	0.0378	0.17	0.00	0.00
n-Octane	0.15%	0.0335	0.15	0.00	0.00	0.0021	0.01	0.00	0.00	0.0356	0.16	0.00	0.00
Ethylbenzene	0.00%	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000	0.00	0.00	0.00
p-Xylene	0.14%	0.0317	0.14	0.00	0.00	0.0019	0.01	0.00	0.00	0.0336	0.15	0.00	0.00
2-Methyloctane	0.15%	0.0327	0.14	0.00	0.00	0.0021	0.01	0.00	0.00	0.0348	0.15	0.00	0.00
n-Nonane	0.13%	0.0298	0.13	0.00	0.00	0.0018	0.01	0.00	0.00	0.0316	0.14	0.00	0.00
2-Methylnonane	0.50%	0.1101	0.48	0.00	0.01	0.0068	0.03	0.00	0.00	0.1169	0.51	0.00	0.01
n-Decane	0.11%	0.0242	0.11	0.00	0.00	0.0015	0.01	0.00	0.00	0.0257	0.11	0.00	0.00
n-C11	0.07%	0.0165	0.07	0.00	0.00	0.0010	0.00	0.00	0.00	0.0175	0.08	0.00	0.00
Water	1.78%	0.3940	1.73	0.01	0.03	0.0244	0.11	0.00	0.00	0.4184	1.83	0.01	0.04
Total	99.98%	22.18	97.13	0.44	1.94	1.37	5.99	0.03	0.12	23.54	103.12	0.47	2.06
Total VOC	60.79%	13.48	59.06	0.27	1.18	0.83	3.64	0.02	0.07	14.32	62.71	0.29	1.25
Total HAP	1.77%	0.39	1.72	0.01	0.03	0.02	0.11	0.00	0.00	0.42	1.83	0.01	0.04

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

LDAR Monitoring Yes

Fugitive Leaks

Equipment type	Count	Leak Emission Factors lb/hr/component[a]	Source of Leak Emission Factors (Specify if EPA protocol or others)	Stream Type (Gas/Liquid etc)	Gas VOC Wt%[b]	Gas HAP Wt %	Gas CH4 Wt%	Light Oil VOC Wt %[d]	Light Oil HAP Wt %	Light Oil CH4 Wt%	Control Percentage[c]	Pre-Control VOC Potential Emissions (lb/hr)	Potential VOC Emissions (lb/hr)	Potential VOC Emissions (tpy)	Pre-Control Potential HAP Emissions (lb/hr)	Potential HAP Emissions (lb/hr)	Potential HAP Emissions (tpy)
Connectors/Flanges	2490	0.00044	EPA Protocol	Natural Gas	19.97%	0.45%	58.14%	100.00%	2.82%	0.92%	30.00%	0.2193	0.1535	0.6722	0.0049	0.0035	0.0151
Connectors/Flanges	0	0.00046	EPA Protocol	Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	30.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Connectors/Flanges	1505	0.000243	EPA Protocol	Water/Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	30.00%	0.3650	0.2555	1.1190	0.0103	0.0072	0.0315
Compressors	11	0.01940	EPA Protocol	Natural Gas	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0426	0.0107	0.0467	0.0010	0.0002	0.0011
Open-Ended Lines	0	0.00441	EPA Protocol	Natural Gas	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	0	0.00529	EPA Protocol	Natural Gas	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	0	0.02866	EPA Protocol	Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pump Seals	3	0.00005	EPA Protocol	Water/Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0002	0.0000	0.0002	0.0000	0.0000	0.0000
Valves	1045	0.00992	EPA Protocol	Natural Gas	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	2.0703	0.5176	2.2670	0.0467	0.0117	0.0511
Valves	0	0.00551	EPA Protocol	Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Valves	898	0.00022	EPA Protocol	Water/Light Oil	19.97%	0.45%	56.13%	100.00%	2.82%	0.92%	75.00%	0.1455	0.0485	0.2124	0.0055	0.0014	0.0060
				Total								**2.8428**	**0.9857**	**4.3175**	**0.0683**	**0.0239**	**0.1048**

[a] *Table 2-4. Oil & Gas Production Operations Average Emission Factors, Protocol for Equipment Leak Emission Estimates, EPA 453/R-95-017, November 1995.*

[b] *VOC and HAP weight percent based on representative gas analysis.*

[c] *Based on Texas Commission on Environmental Quality (TCEQ) 28VHP Control Program and guidance titled "Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives".*

[d] *No analysis for Water/Light Oil so assume it is same VOC percentage as Light Oil to be conservative.*

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Blowdown and ESD Emission Estimates

	Type of Compressor Engine	Number of Engines	Compressor Blowdown Volume* (scf)	Gas Density (lb/scf)	Gas Emitted Per Blowdown (lbs)	Blowdowns/ Year/ Engine	VOC (wt%)	HAPs (wt%)	CO_2 (wt%)	CH_4 (wt%)	Total Blowdown Emissions VOC (TPY)	HAPs (TPY)	CO_2 (TPY)	CH_4 (TPY)
Smith Compressor Station	Waukesha L7042GSI	2	2,015	0.0564	114	36	19.97%	0.45%	0.21%	58%	0.82	0.02	0.01	2.38
Smith Compressor Station	Waukesha P9390GSI	8	2,896	0.0564	163	36	19.97%	0.45%	0.21%	58%	4.70	0.11	0.05	13.68

* Compressor Blowdown Volume is based on the total volume of all piping for the specific engine make and model.

** Gas emitted per blowdown (lbs) = Compressor Blowdown Volume (ft^3) x Gas Density at Inlet Pressure (lb/ft^3)

Notes: - All engine blowdowns are routed to the station inlet. Any gas remaining that is below the inlet pressure is released to atmosphere
- Inlet Pressure (psig) is conservative. Average pressures observed over the past year have been well below this value.

	Type of Blowdown	Gas Emitted Per ESD*** (lbs)	Number of ESD per year	VOC (wt%)	HAPs (wt%)	CO_2 (wt%)	CH_4 (wt%)	Total ESD Emissions VOC (TPY)	HAPs (TPY)	CO_2 (TPY)	CH_4 (TPY)
Smith Compressor Station	Emergency Shutdown	8,279	2	19.97%	0.45%	0.21%	58%	1.65	0.04	0.02	4.81

*** Gas Emitted Per ESD is based on the site-specific volume of all piping and gas pressures observed at the Smith CS for an uncontrolled emergency shutdown (ESD)

Pollutant	Constituent Weight Percent (%)	Total HAP Emissions (tpy)
Benzene	0.01%	0.0045
Toluene	0.01%	0.0045
Ethylbenzene	0.00%	0.0000
n-hexane	0.50%	0.1795
Xylenes	0.04%	0.0135

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station

Condensate Truck Loadout Emissions

Station	Volume Loaded (gal/yr)	Saturation Factor[1]	Vapor Pressure[2] (psia)	Vapor Molecular Weight[2] (lb/lb-mol)	Liquid Temp[3] (°F)	Liquid Temp (°R)	Loading Loss[4] (lb VOC/1000 gal)	Uncontrolled VOC Loading Loss[5] (lb/yr)	(tpy)
Smith Compressor Station	545,906	0.6	4.94	66	52.91	513	4.7	33.70	0.02

[1] From AP-42 Table 5.2-1, for tank trucks in submerged loading: dedicated normal service
[2] Based on 12 month average of vapor pressures from Tanks 4.0.9d
[3] Daily average liquid surface temperature (TANKS 4.09d)
[4] Loading Loss (lb VOC/1000 gal) = (12.46*S*P*M)/T [AP42 Section 5.2 (1/95)]
[5] AP-42 specifies 98.7% control for NSPS trucks per Section 5.2-4

MarkWest Liberty Midstream and Resources, L.L.C.
Smith Compressor Station
Crankcase Emissions

Crankcase Blowby Percentage[1] 3%

Pollutant	Total Engine Emissions		Blowby Percentage	Blowby Emissions	
	lb/hr	tpy		lb/hr	tpy
NO_X	8.29	36.31	3%	0.25	1.09
CO	10.71	46.91		0.32	1.41
VOC	5.65	24.74		0.17	0.74
SO_2	0.09	0.38		0.00	0.01
PM	1.46	6.39		0.04	0.19
Benzene	0.23	1.01		0.01	0.03
Toluene	0.08	0.36		0.00	0.01
Ethylbenzene	0.00	0.02		0.00	0.00
Xylenes	0.03	0.12		0.00	0.00
n-Hexane	0.00	0.00		0.00	0.00
Formaldehyde	0.41	1.82		0.01	0.05
Total HAPs	2.16	9.44		0.06	0.28

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	Description	Location/Site	Gas Source Basis	Low/High Pressure (PSIG) Basis	Pressure	High to Low Pressure Jumper	Control Device Present	L/R	Size	Class	Area	Pigging Frequency	Pigging Frequency	Pigging Schedule Per Year	PSIG[1]	Temp	Launcher/Receiver Volume (ACF)	Z Factor*	R Factor (psfa*ft3*lbmol/(lb*R))	MW of Gas[2]	VOC Wt% of Gas[3]	VOC Emissions (tpy)	HAP wt% of Gas	HAP Emissions (tpy)	Methane wt % of Gas	Methane Emissions (tpy)	Benzene Wt% of Gas	Benzene Emissions (tpy)	Toluene Wt% of Gas	Toluene Emissions (tpy)	Ethylbenzene Wt% of Gas	Ethylbenzene Emissions (tpy)	n-hexane Wt% of Gas	n-hexane Emissions (tpy)	Xylene Wt% of Gas	Xylene Emissions (tpy)
2	Airport to Smith Receiver	CS Smith	Smith CS	Smith CS	LP	N	N	Receiver	20	150	Liberty PA	12	Monthly	144	120	60	62.72	0.9584	1545	22	23	0.575626154	0.45	0.011262251	58.14	1.455082809	0.01	0.000250272	0.01	0.000250272	0	0	0.4	0.01001089	0.03	0.000750817
3	Smith to Joe Cain (Laffert)	CS Smith	Smith CS	Smith CS	HP	Y	N	Launcher	20	600	Liberty PA	1	Daily	365	120	60	62.83	0.9584	1545	22	23	1.461611329	0.45	0.028596743	58.14	3.694699248	0.01	0.000635483	0.01	0.000635483	0	0	0.4	0.025419327	0.06	0.003812899
4	Moore Park South	CS Smith	Smith CS	Smith CS	LP	N	N	Receiver	12	150	Liberty PA	2	Weekly	104	120	60	20.35	0.9584	1545	22	23	0.134886886	0.45	0.002639091	58.14	0.34097059	0.01	5.86465E-05	0.01	5.86465E-05	0	0	0.4	0.002345859	0.06	0.000351879
5	Future Receiver	CS Smith	Smith CS	Smith CS	LP	N	N	Receiver	12	150	Liberty PA	2	Weekly	104	120	60	14	0.9584	1545	22	23	0.092796875	0.45	0.001815591	58.14	0.234574362	0.01	4.03465E-05	0.01	4.03465E-05	0	0	0.4	0.001613859	0.26	0.001049008
6																					Total	2.264921245		0.044313677		5.725327008		0.000984748		0.000984748		0		0.039389935		0.005964603
7	[1] The pressure analysis for this station shows less than 300 psia but using 120 psia here to be conservative.																																			
8	[2] The gas analysis for the station is 21.4 lb/lbmol MW but using 22 lb/lbmol MW as the maximum in the system to be conservative.																																			
9	[3] The gas analysis for the station is 19.79% Wt VOC but using 23% to be conservative.																																			

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Smith CS
City:	Pittsburgh
State:	Pennsylvania
Company:	MarkWest
Type of Tank:	Vertical Fixed Roof Tank
Description:	Smith 2018 SOOP Application

Tank Dimensions

Shell Height (ft):		20.00
Diameter (ft):		12.00
Liquid Height (ft) :		20.00
Avg. Liquid Height (ft):		12.00
Volume (gallons):		16,920.59
Turnovers:		16.13
Net Throughput(gal/yr):		272,953.00
Is Tank Heated (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Aluminum/Diffuse
Roof Condition:	Good

Roof Characteristics

Type:	Dome	
Height (ft)		1.00
Radius (ft) (Dome Roof)		12.00

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

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

Smith CS - Vertical Fixed Roof Tank
Pittsburgh, Pennsylvania

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 10)	All	57.47	48.97	65.97	52.91	4.9359	4.1674	5.8141	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

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

Emissions Report for: Annual

Smith CS - Vertical Fixed Roof Tank
Pittsburgh, Pennsylvania

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	2,117.13	1,525.65	3,642.78

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Smith CS Dehydrator
File Name: S:\EH&S ENVIRONMENTAL\Working Files\Liberty M&R\Smith CS\SOOP\Smith Dehydrator.ddf
Date: November 08, 2018

DESCRIPTION:

Description: 130 MMSCFD TEG Dehydration

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.8212	19.709	3.5969
Ethane	0.3707	8.896	1.6235
Propane	0.2913	6.991	1.2759
Isobutane	0.0470	1.128	0.2058
n-Butane	0.1645	3.947	0.7204
Isopentane	0.0452	1.086	0.1981
n-Pentane	0.0774	1.859	0.3392
n-Hexane	0.0460	1.105	0.2017
Cyclohexane	0.0183	0.440	0.0804
Other Hexanes	0.0449	1.078	0.1968
Heptanes	0.0751	1.802	0.3288
Benzene	0.0109	0.261	0.0477
Toluene	0.4486	10.768	1.9651
C8+ Heavies	0.0508	1.220	0.2226
Total Emissions	2.5121	60.290	11.0029
Total Hydrocarbon Emissions	2.5121	60.290	11.0029
Total VOC Emissions	1.3202	31.685	5.7825
Total HAP Emissions	0.5056	12.134	2.2144
Total BTEX Emissions	0.4595	11.029	2.0128

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	41.0617	985.481	179.8503
Ethane	18.5336	444.806	81.1771
Propane	14.5661	349.587	63.7997
Isobutane	2.3495	56.388	10.2908
n-Butane	8.2238	197.371	36.0202
Isopentane	2.2620	54.288	9.9075
n-Pentane	3.8723	92.935	16.9606
n-Hexane	2.3024	55.259	10.0847
Cyclohexane	0.9174	22.018	4.0183
Other Hexanes	2.2466	53.919	9.8402
Heptanes	3.7539	90.093	16.4420
Benzene	0.5455	13.092	2.3893
Toluene	22.4703	539.288	98.4201
C8+ Heavies	2.5412	60.990	11.1307

Total Emissions	125.6465	3015.515	550.3315
Total Hydrocarbon Emissions	125.6465	3015.515	550.3315
Total VOC Emissions	66.0512	1585.228	289.3041
Total HAP Emissions	25.3183	607.639	110.8941
Total BTEX Emissions	23.0158	552.380	100.8094

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	231.1538	5547.692	1012.4537
Ethane	95.3821	2289.171	417.7737
Propane	54.4463	1306.710	238.4746
Isobutane	6.5767	157.841	28.8059
n-Butane	18.7403	449.767	82.0824
Isopentane	4.2523	102.055	18.6250
n-Pentane	5.9899	143.757	26.2356
n-Hexane	1.9264	46.234	8.4378
Cyclohexane	0.2247	5.393	0.9843
Other Hexanes	2.4899	59.758	10.9057
Heptanes	1.4379	34.509	6.2979
Benzene	0.0130	0.313	0.0571
Toluene	0.3033	7.279	1.3284
C8+ Heavies	0.1853	4.448	0.8118
Total Emissions	423.1219	10154.927	1853.2741
Total Hydrocarbon Emissions	423.1219	10154.927	1853.2741
Total VOC Emissions	96.5860	2318.064	423.0466
Total HAP Emissions	2.2428	53.827	9.8233
Total BTEX Emissions	0.3163	7.592	1.3855

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.8212	19.709	3.5969
Ethane	0.3707	8.896	1.6235
Propane	0.2913	6.991	1.2759
Isobutane	0.0470	1.128	0.2058
n-Butane	0.1645	3.947	0.7204
Isopentane	0.0452	1.086	0.1981
n-Pentane	0.0774	1.859	0.3392
n-Hexane	0.0460	1.105	0.2017
Cyclohexane	0.0183	0.440	0.0804
Other Hexanes	0.0449	1.078	0.1968
Heptanes	0.0751	1.802	0.3288
Benzene	0.0109	0.261	0.0477
Toluene	0.4486	10.768	1.9651
C8+ Heavies	0.0508	1.220	0.2226
Total Emissions	2.5121	60.290	11.0029

Total Hydrocarbon Emissions	2.5121	60.290	11.0029
Total VOC Emissions	1.3202	31.685	5.7825
Total HAP Emissions	0.5056	12.134	2.2144
Total BTEX Emissions	0.4595	11.029	2.0128

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	1192.3041	3.5969	99.70
Ethane	498.9509	1.6235	99.67
Propane	302.2743	1.2759	99.58
Isobutane	39.0968	0.2058	99.47
n-Butane	118.1027	0.7204	99.39
Isopentane	28.5325	0.1981	99.31
n-Pentane	43.1962	0.3392	99.21
n-Hexane	18.5225	0.2017	98.91
Cyclohexane	5.0026	0.0804	98.39
Other Hexanes	20.7459	0.1968	99.05
Heptanes	22.7399	0.3288	98.55
Benzene	2.4464	0.0477	98.05
Toluene	99.7485	1.9651	98.03
C8+ Heavies	11.9425	0.2226	98.14
Total Emissions	2403.6057	11.0029	99.54
Total Hydrocarbon Emissions	2403.6057	11.0029	99.54
Total VOC Emissions	712.3507	5.7825	99.19
Total HAP Emissions	120.7174	2.2144	98.17
Total BTEX Emissions	102.1949	2.0128	98.03

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	160.00	deg. F
Condenser Pressure:	14.70	psia
Condenser Duty:	6.14e-001	MM BTU/hr
Produced Water:	19.29	bbls/day
Ambient Temperature:	50.00	deg. F
Excess Oxygen:	15.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	6.14e-001	MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	2.00%	98.00%
Propane	2.00%	98.00%
Isobutane	2.00%	98.00%
n-Butane	2.00%	98.00%
Isopentane	2.00%	98.00%
n-Pentane	2.00%	98.00%
n-Hexane	2.00%	98.00%

Cyclohexane	2.00%	98.00%
Other Hexanes	2.00%	98.00%
Heptanes	2.00%	98.00%
Benzene	2.00%	98.00%
Toluene	2.00%	98.00%
C8+ Heavies	2.00%	98.00%

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25
Calculated Dry Gas Dew Point:	4.91 lbs. H2O/MMSCF
Temperature:	105.0 deg. F
Pressure:	1100.0 psig
Dry Gas Flow Rate:	130.0000 MMSCF/day
Glycol Losses with Dry Gas:	5.9867 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	63.36 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	2.84 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	7.74%	92.26%
Carbon Dioxide	99.83%	0.17%
Nitrogen	99.98%	0.02%
Methane	99.99%	0.01%
Ethane	99.96%	0.04%
Propane	99.95%	0.05%
Isobutane	99.94%	0.06%
n-Butane	99.92%	0.08%
Isopentane	99.93%	0.07%
n-Pentane	99.92%	0.08%
n-Hexane	99.88%	0.12%
Cyclohexane	99.46%	0.54%
Other Hexanes	99.91%	0.09%
Heptanes	99.82%	0.18%
Benzene	95.14%	4.86%
Toluene	93.96%	6.04%
C8+ Heavies	99.63%	0.37%

FLASH TANK

Flash Control:	Recycle/recompression
Flash Temperature:	70.0 deg. F
Flash Pressure:	99.7 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.97%	0.03%
Carbon Dioxide	17.60%	82.40%
Nitrogen	1.06%	98.94%
Methane	1.12%	98.88%
Ethane	4.45%	95.55%

Propane	10.85%	89.15%
Isobutane	17.30%	82.70%
n-Butane	22.70%	77.30%
Isopentane	27.19%	72.81%
n-Pentane	32.87%	67.13%
n-Hexane	50.34%	49.66%
Cyclohexane	80.20%	19.80%
Other Hexanes	42.25%	57.75%
Heptanes	70.38%	29.62%
Benzene	97.77%	2.23%
Toluene	98.77%	1.23%
C8+ Heavies	93.56%	6.44%

REGENERATOR

Regenerator Stripping Gas:
Dry Product Gas
Stripping Gas Flow Rate: 20.0000 scfm

Component	Remaining in Glycol	Distilled Overhead
Water	28.52%	71.48%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.66%	99.34%
n-Pentane	0.63%	99.37%
n-Hexane	0.49%	99.51%
Cyclohexane	3.27%	96.73%
Other Hexanes	1.04%	98.96%
Heptanes	0.43%	99.57%
Benzene	5.00%	95.00%
Toluene	7.86%	92.14%
C8+ Heavies	9.98%	90.02%

STREAM REPORTS:

WET GAS STREAM

Temperature: 105.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 5.43e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.33e-001	3.44e+002
Carbon Dioxide	8.99e-002	5.66e+002
Nitrogen	4.10e-001	1.64e+003
Methane	7.57e+001	1.74e+005

Ethane	1.48e+001	6.36e+004
Propane	5.69e+000	3.58e+004
Isobutane	5.30e-001	4.40e+003
n-Butane	1.48e+000	1.23e+004
Isopentane	3.00e-001	3.09e+003
n-Pentane	4.20e-001	4.33e+003
n-Hexane	1.32e-001	1.63e+003
Cyclohexane	1.40e-002	1.68e+002
Other Hexanes	1.63e-001	2.01e+003
Heptanes	1.11e-001	1.59e+003
Benzene	9.99e-004	1.12e+001
Toluene	2.80e-002	3.69e+002
C8+ Heavies	2.20e-002	5.35e+002
Total Components	100.00	3.06e+005

DRY GAS STREAM

Temperature: 105.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 5.42e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.03e-002	2.66e+001
Carbon Dioxide	8.99e-002	5.65e+002
Nitrogen	4.10e-001	1.64e+003
Methane	7.58e+001	1.74e+005
Ethane	1.48e+001	6.36e+004
Propane	5.69e+000	3.58e+004
Isobutane	5.30e-001	4.40e+003
n-Butane	1.48e+000	1.23e+004
Isopentane	3.00e-001	3.09e+003
n-Pentane	4.20e-001	4.33e+003
n-Hexane	1.32e-001	1.62e+003
Cyclohexane	1.39e-002	1.67e+002
Other Hexanes	1.63e-001	2.00e+003
Heptanes	1.11e-001	1.59e+003
Benzene	9.52e-004	1.06e+001
Toluene	2.63e-002	3.46e+002
C8+ Heavies	2.19e-002	5.33e+002
Total Components	100.00	3.06e+005

LEAN GLYCOL STREAM

Temperature: 105.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	8.31e+003
Water	1.50e+000	1.27e+002
Carbon Dioxide	1.11e-012	9.41e-011
Nitrogen	3.23e-013	2.72e-011
Methane	9.52e-018	8.04e-016
Ethane	1.28e-007	1.08e-005

Propane	8.55e-009	7.22e-007
Isobutane	9.35e-010	7.90e-008
n-Butane	2.76e-009	2.33e-007
Isopentane	1.24e-004	1.05e-002
n-Pentane	2.19e-004	1.84e-002
n-Hexane	1.13e-004	9.57e-003
Cyclohexane	3.53e-004	2.98e-002
Other Hexanes	2.23e-004	1.89e-002
Heptanes	1.74e-004	1.47e-002
Benzene	3.38e-004	2.86e-002
Toluene	2.26e-002	1.91e+000
C8+ Heavies	3.18e-003	2.69e-001
Total Components	100.00	8.44e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 105.00 deg. F
Pressure: 1114.70 psia
Flow Rate: 1.67e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.99e+001	8.31e+003
Water	4.81e+000	4.44e+002
Carbon Dioxide	1.76e-002	1.63e+000
Nitrogen	2.44e-002	2.26e+000
Methane	2.53e+000	2.34e+002
Ethane	1.08e+000	9.98e+001
Propane	6.61e-001	6.11e+001
Isobutane	8.60e-002	7.95e+000
n-Butane	2.62e-001	2.42e+001
Isopentane	6.32e-002	5.84e+000
n-Pentane	9.65e-002	8.92e+000
n-Hexane	4.20e-002	3.88e+000
Cyclohexane	1.23e-002	1.13e+000
Other Hexanes	4.66e-002	4.31e+000
Heptanes	5.25e-002	4.86e+000
Benzene	6.33e-003	5.85e-001
Toluene	2.66e-001	2.46e+001
C8+ Heavies	3.11e-002	2.88e+000
Total Components	100.00	9.24e+003

FLASH TANK OFF GAS STREAM

Temperature: 70.00 deg. F
Pressure: 114.40 psia
Flow Rate: 7.43e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.67e-002	1.29e-001
Carbon Dioxide	1.55e-001	1.34e+000
Nitrogen	4.07e-001	2.23e+000
Methane	7.36e+001	2.31e+002
Ethane	1.62e+001	9.54e+001

Propane	6.30e+000	5.44e+001
Isobutane	5.78e-001	6.58e+000
n-Butane	1.65e+000	1.87e+001
Isopentane	3.01e-001	4.25e+000
n-Pentane	4.24e-001	5.99e+000
n-Hexane	1.14e-001	1.93e+000
Cyclohexane	1.36e-002	2.25e-001
Other Hexanes	1.48e-001	2.49e+000
Heptanes	7.33e-002	1.44e+000
Benzene	8.53e-004	1.30e-002
Toluene	1.68e-002	3.03e-001
C8+ Heavies	5.56e-003	1.85e-001
Total Components	100.00	4.27e+002

FLASH TANK GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.57e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.43e+001	8.31e+003
Water	5.04e+000	4.44e+002
Carbon Dioxide	3.24e-003	2.86e-001
Nitrogen	2.71e-004	2.39e-002
Methane	2.97e-002	2.62e+000
Ethane	5.04e-002	4.45e+000
Propane	7.52e-002	6.63e+000
Isobutane	1.56e-002	1.38e+000
n-Butane	6.24e-002	5.50e+000
Isopentane	1.80e-002	1.59e+000
n-Pentane	3.33e-002	2.93e+000
n-Hexane	2.21e-002	1.95e+000
Cyclohexane	1.03e-002	9.10e-001
Other Hexanes	2.07e-002	1.82e+000
Heptanes	3.88e-002	3.42e+000
Benzene	6.49e-003	5.72e-001
Toluene	2.76e-001	2.43e+001
C8+ Heavies	3.05e-002	2.69e+000
Total Components	100.00	8.82e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.27e+003 scfh

Component	Conc.	Loading

	(vol%)	(lb/hr)
Water	8.09e+001	3.17e+002
Carbon Dioxide	4.29e-002	4.11e-001
Nitrogen	6.35e-002	3.87e-001
Methane	1.17e+001	4.11e+001
Ethane	2.83e+000	1.85e+001
Propane	1.52e+000	1.46e+001
Isobutane	1.86e-001	2.35e+000
n-Butane	6.49e-001	8.22e+000
Isopentane	1.44e-001	2.26e+000
n-Pentane	2.46e-001	3.87e+000
n-Hexane	1.23e-001	2.30e+000
Cyclohexane	5.00e-002	9.17e-001
Other Hexanes	1.20e-001	2.25e+000
Heptanes	1.72e-001	3.75e+000
Benzene	3.21e-002	5.46e-001
Toluene	1.12e+000	2.25e+001
C8+ Heavies	6.85e-002	2.54e+000
Total Components	100.00	4.44e+002

CONDENSER PRODUCED WATER STREAM

Temperature: 160.00 deg. F
Flow Rate: 5.63e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	1.00e+002	2.81e+002	999846.
Carbon Dioxide	9.52e-005	2.68e-004	1.
Nitrogen	3.04e-006	8.57e-006	0.
Methane	5.68e-004	1.60e-003	6.
Ethane	2.73e-004	7.70e-004	3.
Propane	2.71e-004	7.64e-004	3.
Isobutane	2.29e-005	6.44e-005	0.
n-Butane	1.02e-004	2.87e-004	1.
Isopentane	1.87e-005	5.27e-005	0.
n-Pentane	3.36e-005	9.47e-005	0.
n-Hexane	1.54e-005	4.35e-005	0.
Cyclohexane	3.06e-005	8.62e-005	0.
Other Hexanes	1.25e-005	3.51e-005	0.
Heptanes	1.33e-005	3.75e-005	0.
Benzene	4.24e-004	1.19e-003	4.
Toluene	1.35e-002	3.80e-002	135.
C8+ Heavies	2.49e-006	7.00e-006	0.
Total Components	100.00	2.81e+002	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 160.00 deg. F

The calculated flow rate is less than 0.000001 #mol/hr.
The stream flow rate and composition are not reported.

CONDENSER VENT STREAM

Temperature: 160.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.34e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.24e+001	3.60e+001
Carbon Dioxide	1.52e-001	4.11e-001
Nitrogen	2.24e-001	3.87e-001
Methane	4.16e+001	4.11e+001
Ethane	1.00e+001	1.85e+001
Propane	5.36e+000	1.46e+001
Isobutane	6.56e-001	2.35e+000
n-Butane	2.30e+000	8.22e+000
Isopentane	5.09e-001	2.26e+000
n-Pentane	8.71e-001	3.87e+000
n-Hexane	4.34e-001	2.30e+000
Cyclohexane	1.77e-001	9.17e-001
Other Hexanes	4.23e-001	2.25e+000
Heptanes	6.08e-001	3.75e+000
Benzene	1.13e-001	5.44e-001
Toluene	3.95e+000	2.24e+001
C8+ Heavies	2.42e-001	2.54e+000
Total Components	100.00	1.62e+002

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 3.14e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.18e+001	8.21e-001
Ethane	1.49e+001	3.71e-001
Propane	7.98e+000	2.91e-001
Isobutane	9.76e-001	4.70e-002
n-Butane	3.42e+000	1.64e-001
Isopentane	7.57e-001	4.52e-002
n-Pentane	1.30e+000	7.74e-002
n-Hexane	6.45e-001	4.60e-002
Cyclohexane	2.63e-001	1.83e-002
Other Hexanes	6.30e-001	4.49e-002
Heptanes	9.05e-001	7.51e-002
Benzene	1.68e-001	1.09e-002
Toluene	5.88e+000	4.49e-001
C8+ Heavies	3.60e-001	5.08e-002
Total Components	100.00	2.51e+000

APPENDIX D EXISTING LAUNCHER AND RECEIVER PIG RAMP INSTALLATIONS AT STAND-ALONE FACILITY LOCATIONS

NR-Residue Gas: Equipment was not required to be installed because the line contained residue gas
*Coordinates being provided are reflective of the site location and not the individual equipment in this list.

CD PA Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
1	Airport L/R Site	40.37395, -80.30305	Imperial Y 12" LP Receiver	Prior to 7/9/2018
			Joe Cain to Airport 20" LP Receiver	Prior to 7/9/2018
2	Amwell Meter Site	40.14614, -80.20302	Redd Sales 12" HP Receiver	NR-Residue Gas
3	Best Site L/R Site	40.23147, -80.33893	O Donnell Wells 12" LP Receiver	Prior to 7/9/2018
			Best to Best 16" LP Receiver	Prior to 7/9/2018
4	Brenckle Header	40.84400, -80.01438	Bloom Wells 16" LP Receiver	Prior to 7/9/2018
			Michael Wells 12" LP Receiver	Prior to 7/9/2018
5	Bowen Rd L/R Site	40.35620, -80.29091	Chiarelli Wells 20" LP Receiver	Prior to 7/9/2018
6	Drugmand L/R Site	40.32121, -80.30277	Bowen Road to Drugmand 12" LP Receiver	Prior to 7/9/2018
			Drugmand Wells 12" LP Receiver	Prior to 7/9/2018
7	Meter Site Greco	40.09104, -80.20974	Tupta Day Sales 12" HP Receiver	NR-Residue Gas
			Baker Sales 12" HP Receiver	NR-Residue Gas
8	Houston National Fuel M&R Site	40.24940, -80.34876	National Fuel Sales 20" HP Residue Receiver	NR-Residue Gas
9	Lowry Meter Station & L/R Site	40.24942, -80.34873	Lowry Sales 12" HP Residue Receiver	NR-Residue Gas
			Best to Lowry MS 16" LP Receiver	Prior to 7/9/2018
			National Fuel Sales 12" HP Residue Receiver	NR-Residue Gas
10	Mounts Road L/R Site	40.13289, -80.31682	Highland Ridge 20" LP Receiver	Prior to 7/9/2018
			Buffalo Twp Wells 20" LP Receiver	Prior to 7/9/2018
			Franklin Wells 20" LP Receiver	Prior to 7/9/2018
11	Hoskins L/R Station	40.24945, -80.26379	J Hoskins Wells 12" LP Receiver	Prior to 7/9/2018
			Bird Run Wells 12" LP Receiver	Prior to 7/9/2018

CD PA Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
11	Hoskins L/R Station	40.24945, -80.26379	Shaw to R Hoskins 12" LP Receiver	Prior to 7/9/2018
			Wylie Wells 12" LP Receiver	Prior to 7/9/2018
12	Patterson Rd (Avella) L/R Site	40.27381, -80.42744	Avella Land Wells 12" LP Receiver	Prior to 7/9/2018
13	ROW Bame		Bame 20" LP Receiver	Prior to 7/9/2018
14	ROW Bare	40.41178 -80.35589	Bare Wells 12" LP Receiver	Prior to 7/9/2018
			Harmon D to Bare 20" LP Receiver	Prior to 7/9/2018
15	ROW Behm	40.79583, -80.04148	McElhinney Wells 10" LP Receiver	Prior to 7/9/2018
16	ROW Best	40.23164, -80.33641	J Miller Wells 12" LP receiver	Prior to 7/9/2018
17	ROW Breakneck	40.77764, -80.08564	Breakneck Wells 10" LP Receiver	Prior to 7/9/2018
18	Claysville Taylorstown Rd L/R Site	40.14849, -80.40984	Breese Wells 12" LP Receiver	Prior to 7/9/2018
19	Fallen Timber Rd L/R Site	40.27072, -80.49157	Campbell Wells 12" LP Receiver	Prior to 7/9/2018
20	Hillcrest Ln L/R Site	40.21167, -80.34995	Chappel Wells 12" LP Receiver	Prior to 7/9/2018
21	Scenic Dr (Chase) L/R Site	40.19905, -80.44969	Chase Wells 12" LP Receiver	Prior to 7/9/2018
22	Fox Road (Cravat Coal) L/R Site	40.20519, -80.42570	Cravat Coal Wells 12" LP Receiver	Prior to 7/9/2018
23	Oakleaf Rd L/R Site	40.25409, -80.37131	Cross Creek 41-44 Wells 12" LP Receiver	Prior to 7/9/2018
24	Lynn Portal Rd L/R Site	40.25874, -80.36964	Cross Creek 6-9, 25H Wells 12" LP Receiver	Prior to 7/9/2018
25	Grimes L/R Site	40.13299, -80.43109	Old McDonald Wells 12" LP Receiver	Prior to 7/9/2018
26	McGowan Rd L/R Site	40.14279, -80.22140	E Redd to McGowan 12" LP Receiver	Prior to 7/9/2018
			McElree to McGowan 12" LP Receiver	Prior to 7/9/2018
27	Buck Run Rd L/R Site	40.18536, -80.44308	Varner 20" LP Receiver	Prior to 7/9/2018
			PA Game Commission A 12" LP Receiver	Prior to 7/9/2018
28	Brush Run Rd L/R Site	40.20720, -80.37080	E West Wells 12" LP Receiver	Prior to 7/9/2018
29	Scenic Dr (Falconi) L/R Site	40.26595, -80.46084	Falconi Wells 12" LP Receiver	Prior to 7/9/2018
30	Deerfield Rd L/R Site	40.11630, -80.27285	Folly Hollow Wells 12" LP Receiver	Prior to 7/9/2018
31	ROW Hamilton	40.85929, -80.14286	Hamilton to Grubbs 12" LP Receiver	Prior to 7/9/2018

CD PA Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
32	Pleasant Valley Rd (Hanes) L/R Site	40.16377, -80.34140	Hanes Wells 12" LP Receiver	Prior to 7/9/2018
33	Buck Run Rd (Hercules) L/R Site	40.13837, -80.42497	Hercules Wells 12" LP Receiver	Prior to 7/9/2018
34	Toll Gate Rd L/R Site	40.10314, -80.46782	Hunter Wells 12" LP Receiver	Prior to 7/9/2018
35	ROW JRGL	40.84398, -80.10487	JRGL Wells 10" LP Receiver	Prior to 7/9/2018
36	Hackney Station Rd L/R Site	40.03182, -80.21131	Kearney Wells 12" LP Receiver	Prior to 7/9/2018
37	Valleyview Rd L/R Site	40.40304, -80.33243	Kendall Wells 12" LP Receiver	Prior to 7/9/2018
38	Sugar Run Rd	40.23188, -80.47933	Kennedy Wells 12" LP Receiver	Prior to 7/9/2018
39	Meddings Rd (Little) L/R Site	40.26507, -80.23774	C Little Wells 12" LP Receiver	Prior to 7/9/2018
40	ROW LL Property	40.84029, -80.08598	LL Property Wells 12" LP Receiver	Prior to 7/9/2018
41	Walker Rd L/R Site	40.35085, -80.42689	MCC Partners Wells 12" LP Receiver	Prior to 7/9/2018
42	Strope Rd L/R Site	40.33513, -80.44326	MCC West Wells 12" LP Receiver	Prior to 7/9/2018
43	Nickolay Rd L/R Site	40.30167, -80.40734	McIntyre Wells 12" LP Receiver	Prior to 7/9/2018
44	McMaster L/R Site	40.31124, -80.30097	McMasters Wells 12" LP Receiver	Prior to 7/9/2018
			Menichi Wells 12" LP Receiver	Prior to 7/9/2018
45	Caldwell Rd L/R Site	40.28261, -80.35555	OVBC Wells 12" LP Receiver	Prior to 7/9/2018
46	ROW Pallack	40.85004, -80.08157	Pallack Wells 12" LP Receiver	Prior to 7/9/2018
47	ROW Parees	40.38722, -80.30502	Parees Wells 12" LP Receiver	Prior to 7/9/2018
48	Scenic Dr (Pete Zappi) L/R Site	40.20364, -80.44809	P Zappi Wells 12" LP Receiver	Prior to 7/9/2018
49	McAdams Rd (Phelan) L/R Site	40.09539, -80.22951	Phelan Wells 12" LP Receiver	Prior to 7/9/2018
50	Carns Lane L/R Site	40.32423, -80.36576	Pollana Wells 12" LP Receiver	Prior to 7/9/2018
51	ROW Powell	40.74363, -79.96049	Powell Wells 12" LP Receiver	Prior to 7/9/2018
52	Patterson Rd (R. Margaria) L/R Site	40.28723, -80.43589	R Margaria Wells 12" LP Receiver	Prior to 7/9/2018
53	Agape Rd (Rukavina) L/R Site	40.26725, -80.36329	Rukavina Wells 12" LP Receiver	Prior to 7/9/2018
54	Fox Rd (Rush) L/R Site	40.22866, -80.42395	Rush Wells 12" LP Receiver	Prior to 7/9/2018
55	Patterson Ln (L/R) Site	40.22064, -80.33797	R Carlisle Wells 12" LP Receiver	Prior to 7/9/2018
56	Joffre Cherry Valley Rd L/R Site	40.35359, -80.33301	Sasso Wells 12" LP Receiver	Prior to 7/9/2018
57	ROW Schilling	40.75341, -79.99506	Schilling Wells LP Receiver	Prior to 7/9/2018
58	Dille Rd (Strawn) L/R Site	40.04603, -80.24107	Strawn Wells 12" LP Receiver	Prior to 7/9/2018

CD PA Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
59	ROW Varner	40.17378, -80.46539	Varner Wells 12" LP receiver	Prior to 7/9/2018
60	Lynn Rd L/R Site	40.22840, -80.32462	Ward Wells 12" LP Receiver	Prior to 7/9/2018
61	ROW Warner	40.84397, -80.11171	Warner Wells 12" LP Receiver	Prior to 7/9/2018
62	ROW West	40.75104, -79.97716	West Wells 12" LP Receiver	Prior to 7/9/2018
63	Dillie Rd (Whitmer) L/R Site	40.04048, -80.23640	Whitmer Wells 12" LP Receiver	Prior to 7/9/2018
66	Temple T L/R Site	40.22417, -80.44906	E Zappi 20" LP Receiver	Prior to 7/9/2018
67	Agape Rd (Triple) L/R Site	40.26804, -80.36563	Costanzo Wells 12" LP Receiver	Prior to 7/9/2018
			Lowry to Triple 12" LP Receiver	Prior to 7/9/2018
68	Well Pad Bare	40.40342, -80.37723	Harmon D Wells 12" LP Receiver	Prior to 7/9/2018
69	Well Pad Behm	40.79672, -80.03451	Lamperski Wells 12" LP Receiver	Prior to 7/9/2018
71	Well Pad Breakneck	40.77075, -80.10355	Bell Properties Well 12" LP Receiver	Prior to 7/9/2018
72	Well Pad Burgh	40.87569, -80.12625	Perry Wells 12" LP receiver	Prior to 7/9/2018
73	Well Pad Carol Baker	40.23009, -80.27796	Yanavich Wells 12" LP Receiver	Prior to 7/9/2018
74	Well Pad Carson B	40.84625, -80.03219	Bricker Wells 8" LP Receiver	Prior to 7/9/2018
75	Well Pad Chase	40.20175, -80.46770	D Green Wells 12" LP Receiver	Prior to 7/9/2018
76	Durkacs L/R Site	40.28397, -80.22913	Troyer Wells 12" LP Receiver	Prior to 7/9/2018
77	Well Pad Eleanor West	40.20710, -80.38557	Khouri Wells 12" LP Receiver	Prior to 7/9/2018
78	Well Pad Ferree	40.72843, -79.90603	Reno Wells 12" LP Receiver	Prior to 7/9/2018
			Hofer Wells 12" LP Receiver	Prior to 7/9/2018
79	Well Pad Franklin 2	40.14094, -80.26221	Franklin Wells 12" LP Receiver	Prior to 7/9/2018
80	Well Pad Gilliland	40.84241, -80.03392	Brenkle Wells 16" LP Receiver	Prior to 7/9/2018
			Carson Wells 10" LP Receiver	Prior to 7/9/2018
81	Well Pad John Miller	40.21521, -80.31559	Kopko Wells 12" LP Receiver	Prior to 7/9/2018
82	Well Pad Kraeer	40.21816, -80.45752	Kraeer West Wells 12" LP Receiver	Prior to 7/9/2018
83	Well Pad Lynn	40.82164, -79.96377	Shipley Wells LP 12" Receiver	Prior to 7/9/2018
84	Well Pad MCC	40.34397, -80.43256	Burkett Wells 12" LP Receiver	Prior to 7/9/2018
85	Well Pad McElhinney	40.77986, -80.01889	Stebbin Well 12" LP Receiver	Prior to 7/9/2018
87	Well Pad Midler A	40.29650, -80.41270	Kancel Wells 12" LP Receiver	Prior to 7/9/2018

CD PA Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
88	Well Pad Paxton	40.25621, -80.24725	R Hoskins to Paxton 12" LP Receiver	Prior to 7/9/2018
89	Well Pad Plesniak	40.87216, -80.08007	Ceasar Wells 12" LP Receiver	Prior to 7/9/2018
			Flinner Wells 12" LP Receiver	Prior to 7/9/2018
			Burr/Brennan Wells 12" LP Receiver	Prior to 7/9/2018
90	Well Pad Pollana	40.30559, -80.36009	W Cowden Wells 12" LP Receiver	Prior to 7/9/2018
91	Well Pad R. Margaria	40.28531, -80.43233	Cross Creek 17-19H, 45-47H Wells 12" LP Receiver	Prior to 7/9/2018
92	Well Pad Stebbins	40.79463, -79.96722	Lynn Wells 12" LP Receiver	Prior to 7/9/2018
93	Well Pad Stefkovich	40.27733, -80.45377	A Paris Wells 12" LP Receiver	Prior to 7/9/2018
94	Well Pad Talarico	40.79264, -80.08005	Meyer Wells 12" LP Receiver	Prior to 7/9/2018
95	Well Pad Worstell	40.27474, -80.21630	Photon Wells 12" LP Receiver	Prior to 7/9/2018
121	Well Pad Hunter	40.09600, -80.47336	Greaves Wells 12" LP Receiver	Prior to 7/9/2018
123	Well Pad Kendall	40.40645, -80.32643	Matchett Wells 12" LP Receiver	Prior to 7/9/2018
157	ROW L. Smith L/R	40.11939, -80.34563	L Smith 12" LP Receiver	Prior to 7/9/2018
162	Well Pad Graham	40.83919, -80.05586	Voll to Graham Receiver	Prior to 7/9/2018
164	Well Pad Ballie Trust	40.76065, -80.08748	Meyer Wells 12" LP Receiver	Prior to 7/9/2018
174	Well Pad Reno	40.73497, -79.89145	Sharlow Wells 12" LP Receiver	Prior to 7/9/2018
176	Well Pad R. Double	40.79726, -80.08143	Talarico Wells 12" LP Receiver	Prior to 7/9/2018
183	Well Pad Alex Paris	40.29338, -80.46162	Galaran 12" LP Receiver	Prior to 7/9/2018
186	Well Pad Burkett	40.32740, -80.45561	Bethel Ridge Wells 12" LP Receiver	Prior to 7/9/2018
201	Prospect Road Launcher	40.80188, -80.05266	Behm 10" Wells LP Receiver	Prior to 7/9/2018

CD OH Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
1	Bolton Launcher Station	39.93814, -81.20633	Routh Receiver	Prior to 7/9/2018
			Bahmer Receiver	Prior to 7/9/2018
2	Wright Station	39.93308, -81.20874	Bolton Receiver	Prior to 7/9/2018
3	Caston Miller Receiver Station	40.13012, -81.32317	Caston Receiver	Prior to 7/9/2018
			Miller Receiver	Prior to 7/9/2018
4	Coal Run Eagle Creek Station	40.06735, -81.09946	Triple B Receiver	Prior to 7/9/2018
5	Eagle Creek Receiver Station	40.08093, -81.11500	Eagle Creek Receiver	Prior to 7/9/2018
6	Groh Receiver Station	40.11237, -81.36646	Groh Receiver	Prior to 7/9/2018
			RH Receiver	Prior to 7/9/2018
7	Heavillin Road Station	40.26828, -81.14864	Jones Receiver	Prior to 7/9/2018
			Rose Receiver	Prior to 7/9/2018
8	Inherst Station	39.88986, -81.17780	Amanda Receiver	Prior to 7/9/2018
9	Leatherwood Station	39.96628, -81.27320	J Anderson Receiver	Prior to 7/9/2018
10	Greenlawn Road Station	39.98566, -81.28713	J Hall Receiver	Prior to 7/9/2018
12	Kinsey Station	40.28931, -81.27995	Clark South Receiver	Prior to 7/9/2018
			Gooding Receiver	Prior to 7/9/2018
13	Crum Road Station	39.86199, -81.04593	Shriver DG Receiver	Prior to 7/9/2018
14	National OCO Road Station	40.08368, -81.01687	Bedway Receiver	Prior to 7/9/2018
15	Miller Road Station	40.10929, -81.07026	70T to Miller Rd Receiver	Prior to 7/9/2018
			Oak Hill Receiver	Prior to 7/9/2018
16	Eldon Road Station	39.95079, -81.25922	Noble Receiver	Prior to 7/9/2018
17	Oak Hill Road Station	40.10056, -81.02129	Lude Rd Receiver	Prior to 7/9/2018
			Prosser Receiver	Prior to 7/9/2018
18	Old Piedmont Kimble Station	40.19787, -81.19360	Stout Receiver	Prior to 7/9/2018
			Tarbert Receiver	Prior to 7/9/2018
			Vozar Receiver	Prior to 7/9/2018
19	Ripley Station-2	40.14402, -81.30548	Lake LND Receiver	Prior to 7/9/2018
20	Buskirk Lane Detweiler Station	39.99464, -81.39308	Stiers Receiver	Prior to 7/9/2018

CD OH Facility No.	Facility	Coordinates	Equipment	Pig Ramp Installation Date
21	Stutzman Station-2	39.89106, -81.17181	Wesley Receiver	Prior to 7/9/2018
22	Mt. Olivett Shugert Station - 3	40.03870, -81.14622	Swallie Receiver	Prior to 7/9/2018
23	Tyson Receiver Station	40.18774, -81.16244	Michael 6" Receiver	Prior to 7/9/2018
			Puskarich Receiver	Prior to 7/9/2018
28	BK Stephens-2	40.18575, -81.16655	Michael 12" Receiver	Prior to 7/9/2018
32	Marshall Road Station	40.10722, -81.33072	Blaze Receiver	Prior to 7/9/2018
			Raber Receiver	Prior to 7/9/2018
			Guernsey 12" Receiver	Prior to 7/9/2018
35	Ohio 556 Station	39.85631, -80.99647	Lepley Receiver	Prior to 7/9/2018
			Lucas Rd DG Receiver	Prior to 7/9/2018
36	Hudson Road Station	39.86117, -81.01786	Westhawk DG Receiver	Prior to 7/9/2018
37	Trembly Ridge Road Station	39.80992, -81.04044	Howell Receiver	Prior to 7/9/2018
			Jones DG Receiver	Prior to 7/9/2018
42	McGee Station	39.94562, -81.23406	513 to McGee Receiver	Prior to 7/9/2018
			Brothers Receiver	Prior to 7/9/2018
			Tri County to McGee Receiver	Prior to 7/9/2018
51	Shugert Daddy Station	40.00523, -81.41198	Shipman Receiver	Prior to 7/9/2018
54	Wesley Station	39.89328, -81.15947	Clark Receiver	Prior to 7/9/2018
57	Karen Station	40.02580, -81.29045	Coad Receiver	Prior to 7/9/2018
61	Cadiz Road Piedmont Clay Station	40.17769, -81.23427	Donna Receiver	Prior to 7/9/2018
65	Swallie Station	40.03919, -81.13987	Jade Receiver	Prior to 7/9/2018

APPENDIX E MOBILE FLARE RECORDS

Site	Date/Time	Activity	First Control Device	Second Control Device
129 Station to Cameron-Launcher	7/26/2018 10:30	Launch	Zevac	None
129 Station to Cameron-Launcher	8/30/2018 11:17	Launch	Zevac	None
129 Station to Cameron-Launcher	9/13/2018 12:20	Launch	Zevac	None
129 Station to Cameron-Launcher	9/20/2018 14:20	Launch	Zevac	None
129 Station to Cameron-Launcher	9/27/2018 13:13	Launch	Zevac	None
129 Station to Cameron-Launcher	10/4/2018 13:09	Launch	Zevac	None
129 Station to Cameron-Launcher	10/18/2018 15:47	Launch	Zevac	None
129 Station to Cameron-Launcher	11/14/2018 12:16	Launch	Zevac	None
129 Station to Cameron-Launcher	11/29/2018 13:05	Launch	Zevac	None
129 Station to Cameron-Launcher	12/5/2018 15:47	Preload	Zevac	None
129 Station to Cameron-Launcher	12/5/2018 15:02	Launch	Zevac	None
129 Station to Cameron-Launcher	12/11/2018 16:43	Launch	Zevac	None
129 Station to Cameron-Launcher	12/12/2018 15:35	Preload	Zevac	None
129 Station to Cameron-Launcher	1/1/2019 12:50	Launch	Zevac	None
513 to Mcgee-Launcher	7/2/2018 11:22	Launch	Zevac	None
513 to Mcgee-Launcher	7/2/2018 11:20	Preload	Zevac	None
513 to Mcgee-Launcher	7/9/2018 10:57	Preload	Zevac	None
513 to Mcgee-Launcher	7/9/2018 17:00	Launch	Zevac	None
513 to Mcgee-Launcher	7/16/2018 11:40	Launch	Zevac	None
513 to Mcgee-Launcher	7/16/2018 12:20	Preload	Zevac	None
513 to Mcgee-Launcher	7/23/2018 22:35	Launch	Zevac	None
513 to Mcgee-Launcher	7/23/2018 17:00	Preload	Zevac	None
513 to Mcgee-Launcher	7/30/2018 10:27	Launch	Zevac	None
513 to Mcgee-Launcher	7/30/2018 12:00	Preload	Zevac	None
513 to Mcgee-Launcher	8/6/2018 10:26	Launch	Zevac	None
513 to Mcgee-Launcher	8/6/2018 11:02	Preload	Zevac	None
513 to Mcgee-Launcher	8/13/2018 11:15	Launch	Zevac	None
513 to Mcgee-Launcher	8/13/2018 12:15	Preload	Zevac	None
513 to Mcgee-Launcher	8/20/2018 11:06	Preload	Zevac	None
513 to Mcgee-Launcher	8/27/2018 9:34	Launch	Zevac	None
513 to Mcgee-Launcher	8/27/2018 9:59	Preload	Zevac	None
513 to Mcgee-Launcher	9/4/2018 12:40	Preload	Zevac	None
513 to Mcgee-Launcher	9/4/2018 11:02	Launch	Zevac	None
513 to Mcgee-Launcher	9/10/2018 12:14	Launch	Zevac	None
513 to Mcgee-Launcher	9/10/2018 13:00	Preload	Zevac	None
513 to Mcgee-Launcher	9/17/2018 10:51	Launch	Zevac	None
513 to Mcgee-Launcher	9/24/2018 10:42	Launch	Zevac	None
513 to Mcgee-Launcher	9/24/2018 12:00	Preload	Zevac	None
513 to Mcgee-Launcher	10/1/2018 9:27	Launch	Zevac	None

513 to Mcgee-Launcher	10/1/2018 12:00	Preload	Zevac	None
513 to Mcgee-Launcher	10/8/2018 10:17	Launch	Zevac	None
513 to Mcgee-Launcher	10/8/2018 10:57	Preload	Zevac	None
513 to Mcgee-Launcher	10/15/2018 10:50	Launch	Zevac	None
513 to Mcgee-Launcher	10/15/2018 12:10	Preload	Zevac	None
513 to Mcgee-Launcher	10/22/2018 12:20	Preload	Zevac	None
513 to Mcgee-Launcher	10/30/2018 11:54	Launch	Zevac	None
513 to Mcgee-Launcher	10/30/2018 12:50	Preload	Zevac	None
513 to Mcgee-Launcher	11/5/2018 11:07	Preload	Zevac	None
513 to Mcgee-Launcher	11/13/2018 10:31	Launch	Zevac	None
513 to Mcgee-Launcher	11/13/2018 12:00	Preload	Zevac	None
513 to Mcgee-Launcher	11/20/2018 11:05	Preload	Zevac	None
513 to Mcgee-Launcher	11/20/2018 10:43	Launch	Zevac	None
513 to Mcgee-Launcher	11/26/2018 10:14	Launch	Zevac	None
513 to Mcgee-Launcher	11/26/2018 10:20	Preload	Zevac	None
513 to Mcgee-Launcher	12/3/2018 13:40	Preload	Zevac	None
513 to Mcgee-Launcher	12/10/2018 12:12	Launch	Zevac	None
513 to Mcgee-Launcher	12/10/2018 12:13	Preload	Zevac	None
513 to Mcgee-Launcher	12/17/2018 14:23	Preload	Zevac	None
513 to Mcgee-Launcher	12/24/2018 10:19	Preload	Zevac	None
513 to Mcgee-Launcher	12/31/2018 10:23	Launch	Zevac	None
513 to Mcgee-Launcher	12/31/2018 12:00	Preload	Zevac	None
513 to Mcgee-Launcher	1/7/2019 11:00	Launch	Zevac	None
513 to Mcgee-Launcher	1/7/2019 11:33	Preload	Zevac	None
513 to Mcgee-Receiver	7/2/2018 7:00	Receive	Zevac	None
513 to Mcgee-Receiver	7/9/2018 6:00	Receive	Zevac	None
513 to Mcgee-Receiver	7/16/2018 6:00	Receive	Zevac	None
513 to Mcgee-Receiver	7/23/2018 16:00	Receive	Zevac	None
513 to Mcgee-Receiver	7/30/2018 13:59	Receive	Zevac	None
513 to Mcgee-Receiver	8/6/2018 13:57	Receive	Zevac	None
513 to Mcgee-Receiver	8/13/2018 17:08	Receive	Zevac	None
513 to Mcgee-Receiver	8/20/2018 14:02	Receive	Zevac	None
513 to Mcgee-Receiver	8/27/2018 13:50	Receive	Zevac	None
513 to Mcgee-Receiver	9/4/2018 14:58	Receive	Zevac	None
513 to Mcgee-Receiver	9/10/2018 16:10	Receive	Zevac	None
513 to Mcgee-Receiver	9/17/2018 13:24	Receive	Zevac	None
513 to Mcgee-Receiver	9/24/2018 13:57	Receive	Zevac	None
513 to Mcgee-Receiver	10/1/2018 12:33	Receive	Zevac	None
513 to Mcgee-Receiver	10/8/2018 13:37	Receive	Zevac	None
513 to Mcgee-Receiver	10/15/2018 15:44	Receive	Zevac	None
513 to Mcgee-Receiver	10/22/2018 15:39	Receive	Zevac	None
513 to Mcgee-Receiver	10/30/2018 16:50	Receive	Zevac	None
513 to Mcgee-Receiver	11/5/2018 15:28	Receive	Zevac	None
513 to Mcgee-Receiver	11/13/2018 13:50	Receive	Zevac	None
513 to Mcgee-Receiver	11/20/2018 15:07	Receive	Zevac	None

513 to Mcgee-Receiver	11/26/2018 14:09	Receive	Zevac	None
513 to Mcgee-Receiver	12/3/2018 13:37	Receive	Zevac	None
513 to Mcgee-Receiver	12/10/2018 16:10	Receive	Zevac	None
513 to Mcgee-Receiver	12/17/2018 14:21	Receive	Zevac	None
513 to Mcgee-Receiver	12/24/2018 13:05	Receive	Zevac	None
513 to Mcgee-Receiver	12/31/2018 13:41	Receive	Zevac	None
513 to Mcgee-Receiver	1/7/2019 14:12	Receive	Zevac	None
BK Stevens-Launcher	10/1/2018 10:14	Launch	Zevac	None
BK Stevens-Launcher	10/3/2018 10:24	Launch	Zevac	None
BK Stevens-Launcher	10/5/2018 11:47	Launch	Zevac	None
BK Stevens-Launcher	10/8/2018 10:23	Launch	Zevac	None
BK Stevens-Launcher	10/10/2018 9:17	Launch	Zevac	None
BK Stevens-Launcher	10/12/2018 10:16	Launch	Zevac	None
BK Stevens-Launcher	10/15/2018 10:54	Launch	Zevac	None
BK Stevens-Launcher	10/17/2018 9:53	Launch	Zevac	None
BK Stevens-Launcher	10/19/2018 10:00	Launch	Zevac	None
BK Stevens-Launcher	10/22/2018 11:22	Launch	Zevac	None
BK Stevens-Launcher	10/24/2018 10:34	Launch	Zevac	None
BK Stevens-Launcher	10/26/2018 14:07	Launch	Zevac	None
BK Stevens-Launcher	10/31/2018 11:48	Launch	Zevac	None
BK Stevens-Launcher	11/5/2018 10:39	Launch	Zevac	None
BK Stevens-Launcher	11/7/2018 9:47	Launch	Zevac	None
BK Stevens-Launcher	11/9/2018 10:23	Launch	Zevac	None
BK Stevens-Launcher	11/12/2018 10:59	Launch	Zevac	None
BK Stevens-Launcher	11/16/2018 9:56	Launch	Zevac	None
BK Stevens-Launcher	11/26/2018 9:53	Launch	Zevac	None
BK Stevens-Launcher	12/5/2018 11:19	Launch	Zevac	None
BK Stevens-Launcher	12/10/2018 11:20	Launch	Zevac	None
BK Stevens-Launcher	12/17/2018 11:57	Launch	Zevac	None
BK Stevens-Launcher	12/19/2018 12:39	Launch	Zevac	None
BK Stevens-Launcher	12/21/2018 12:05	Launch	Zevac	None
BK Stevens-Launcher	12/24/2018 11:41	Launch	Zevac	None
BK Stevens-Launcher	12/26/2018 12:53	Launch	Zevac	None
BK Stevens-Launcher	12/28/2018 13:10	Launch	Zevac	None
BK Stevens-Launcher	12/31/2018 12:28	Launch	Zevac	None
BK Stevens-Launcher	1/2/2019 14:07	Launch	Zevac	None
BK Stevens-Launcher	1/4/2019 13:41	Launch	Zevac	None
BK Stevens-Launcher	1/7/2019 11:34	Launch	Zevac	None
BK Stevens-Launcher	1/9/2019 11:29	Launch	Zevac	None
Blaze Rd-Launcher	7/3/2018 10:15	Launch	Zevac	None
Blaze Rd-Launcher	7/5/2018 10:31	Launch	Zevac	None
Blaze Rd-Launcher	7/7/2018 9:10	Launch	Zevac	None
Blaze Rd-Launcher	7/10/2018 10:09	Launch	Zevac	None
Blaze Rd-Launcher	7/12/2018 9:51	Launch	Zevac	None
Blaze Rd-Launcher	7/14/2018 8:49	Launch	Zevac	None

Blaze Rd-Launcher	7/17/2018 11:53	Launch	Zevac	None
Blaze Rd-Launcher	7/19/2018 10:27	Launch	Zevac	None
Blaze Rd-Launcher	7/21/2018 8:32	Launch	Zevac	None
Blaze Rd-Launcher	7/24/2018 10:33	Launch	Zevac	None
Blaze Rd-Launcher	7/26/2018 11:39	Launch	Zevac	None
Blaze Rd-Launcher	7/28/2018 9:13	Launch	Zevac	None
Blaze Rd-Launcher	7/31/2018 13:06	Launch	Zevac	None
Blaze Rd-Launcher	8/2/2018 12:17	Launch	Zevac	None
Blaze Rd-Launcher	8/4/2018 8:42	Launch	Zevac	None
Blaze Rd-Launcher	8/7/2018 11:32	Launch	Zevac	None
Blaze Rd-Launcher	8/9/2018 10:06	Launch	Zevac	None
Blaze Rd-Launcher	8/9/2018 11:56	Preload	Zevac	None
Blaze Rd-Launcher	8/14/2018 10:37	Launch	Zevac	None
Blaze Rd-Launcher	8/16/2018 10:16	Launch	Zevac	None
Blaze Rd-Launcher	8/18/2018 8:38	Launch	Zevac	None
Blaze Rd-Launcher	8/18/2018 12:00	Preload	Zevac	None
Blaze Rd-Launcher	8/23/2018 10:15	Launch	Zevac	None
Blaze Rd-Launcher	8/25/2018 8:26	Launch	Zevac	None
Blaze Rd-Launcher	8/28/2018 10:57	Launch	Zevac	None
Blaze Rd-Launcher	8/30/2018 11:22	Launch	Zevac	None
Blaze Rd-Launcher	9/1/2018 10:04	Launch	Zevac	None
Blaze Rd-Launcher	9/6/2018 11:53	Launch	Zevac	None
Blaze Rd-Launcher	9/6/2018 11:55	Preload	Zevac	None
Blaze Rd-Launcher	9/11/2018 11:23	Preload	Zevac	None
Blaze Rd-Launcher	9/15/2018 8:49	Launch	Zevac	None
Blaze Rd-Launcher	9/18/2018 10:38	Preload	Zevac	None
Blaze Rd-Launcher	9/18/2018 10:40	Launch	Zevac	None
Blaze Rd-Launcher	9/20/2018 10:20	Preload	Zevac	None
Blaze Rd-Launcher	9/25/2018 10:32	Launch	Zevac	None
Blaze Rd-Launcher	9/25/2018 10:43	Preload	Zevac	None
Blaze Rd-Launcher	9/29/2018 9:15	Launch	Zevac	None
Blaze Rd-Launcher	10/2/2018 11:40	Launch	Zevac	None
Blaze Rd-Launcher	10/2/2018 11:59	Preload	Zevac	None
Blaze Rd-Launcher	10/4/2018 14:00	Preload	Zevac	None
Blaze Rd-Launcher	10/9/2018 11:15	Preload	Zevac	None
Blaze Rd-Launcher	10/9/2018 11:17	Launch	Zevac	None
Blaze Rd-Launcher	10/9/2018 12:00	Preload	Zevac	None
Blaze Rd-Launcher	10/13/2018 8:53	Launch	Zevac	None
Blaze Rd-Launcher	10/13/2018 12:00	Preload	Zevac	None
Blaze Rd-Launcher	10/18/2018 12:04	Launch	Zevac	None
Blaze Rd-Launcher	10/18/2018 13:40	Preload	Zevac	None
Blaze Rd-Launcher	10/23/2018 10:45	Preload	Zevac	None
Blaze Rd-Launcher	10/27/2018 9:27	Launch	Zevac	None
Blaze Rd-Launcher	10/30/2018 14:15	Launch	Zevac	None
Blaze Rd-Launcher	11/1/2018 11:32	Preload	Zevac	None

Blaze Rd-Launcher	11/1/2018 11:13	Launch	Zevac	None
Blaze Rd-Launcher	11/6/2018 11:48	Launch	Zevac	None
Blaze Rd-Launcher	11/8/2018 12:26	Preload	Zevac	None
Blaze Rd-Launcher	11/8/2018 11:30	Launch	Zevac	None
Blaze Rd-Launcher	11/12/2018 12:06	Preload	Zevac	None
Blaze Rd-Launcher	11/15/2018 11:01	Launch	Zevac	None
Blaze Rd-Launcher	11/17/2018 10:03	Launch	Zevac	None
Blaze Rd-Launcher	11/20/2018 11:01	Launch	Zevac	None
Blaze Rd-Launcher	11/20/2018 11:03	Preload	Zevac	None
Blaze Rd-Launcher	11/27/2018 10:13	Launch	Zevac	None
Blaze Rd-Launcher	11/29/2018 10:58	Launch	Zevac	None
Blaze Rd-Launcher	12/1/2018 10:10	Launch	Zevac	None
Blaze Rd-Launcher	12/3/2018 14:47	Launch	Zevac	None
Blaze Rd-Launcher	12/4/2018 10:44	Launch	Zevac	None
Blaze Rd-Launcher	12/6/2018 10:29	Launch	Zevac	None
Blaze Rd-Launcher	12/8/2018 10:50	Launch	Zevac	None
Blaze Rd-Launcher	12/10/2018 12:53	Launch	Zevac	None
Blaze Rd-Launcher	12/11/2018 10:31	Launch	Zevac	None
Blaze Rd-Launcher	12/13/2018 11:30	Launch	Zevac	None
Blaze Rd-Launcher	12/15/2018 9:21	Launch	Zevac	None
Blaze Rd-Launcher	12/17/2018 13:11	Launch	Zevac	None
Blaze Rd-Launcher	12/18/2018 13:11	Launch	Zevac	None
Blaze Rd-Launcher	12/20/2018 11:20	Launch	Zevac	None
Blaze Rd-Launcher	12/22/2018 8:50	Launch	Zevac	None
Blaze Rd-Launcher	12/24/2018 12:55	Launch	Zevac	None
Blaze Rd-Launcher	12/25/2018 8:29	Launch	Zevac	None
Blaze Rd-Launcher	12/27/2018 11:24	Launch	Zevac	None
Blaze Rd-Launcher	12/29/2018 10:05	Launch	Zevac	None
Blaze Rd-Launcher	12/31/2018 14:01	Launch	Zevac	None
Blaze Rd-Launcher	1/1/2019 10:31	Launch	Zevac	None
Blaze Rd-Launcher	1/3/2019 10:22	Launch	Zevac	None
Blaze Rd-Launcher	1/5/2019 8:57	Launch	Zevac	None
Blaze Rd-Launcher	1/7/2019 12:47	Launch	Zevac	None
Blaze Rd-Launcher	1/8/2019 10:00	Launch	Zevac	None
Blaze Rd-Receiver	7/3/2018 6:00	Receive	Zevac	None
Blaze Rd-Receiver	7/7/2018 5:00	Receive	Zevac	None
Blaze Rd-Receiver	7/12/2018 6:00	Receive	Zevac	None
Blaze Rd-Receiver	7/17/2018 6:00	Receive	Zevac	None
Blaze Rd-Receiver	7/26/2018 13:46	Receive	Zevac	None
Blaze Rd-Receiver	7/31/2018 14:14	Receive	Zevac	None
Blaze Rd-Receiver	8/4/2018 10:43	Receive	Zevac	None
Blaze Rd-Receiver	8/9/2018 11:52	Receive	Zevac	None
Blaze Rd-Receiver	8/14/2018 12:56	Receive	Zevac	None
Blaze Rd-Receiver	8/18/2018 10:06	Receive	Zevac	None
Blaze Rd-Receiver	8/23/2018 12:52	Receive	Zevac	None

Blaze Rd-Receiver	8/28/2018 12:45	Receive	Zevac	None
Blaze Rd-Receiver	9/1/2018 12:17	Receive	Zevac	None
Blaze Rd-Receiver	9/6/2018 14:39	Receive	Zevac	None
Blaze Rd-Receiver	9/11/2018 12:55	Receive	Zevac	None
Blaze Rd-Receiver	9/15/2018 10:45	Receive	Zevac	None
Blaze Rd-Receiver	9/20/2018 12:47	Receive	Zevac	None
Blaze Rd-Receiver	9/25/2018 13:25	Receive	Zevac	None
Blaze Rd-Receiver	9/29/2018 11:03	Receive	Zevac	None
Blaze Rd-Receiver	10/4/2018 12:36	Receive	Zevac	None
Blaze Rd-Receiver	10/9/2018 13:29	Receive	Zevac	None
Blaze Rd-Receiver	10/13/2018 10:52	Receive	Zevac	None
Blaze Rd-Receiver	10/18/2018 14:46	Receive	Zevac	None
Blaze Rd-Receiver	10/23/2018 11:27	Receive	Zevac	None
Blaze Rd-Receiver	10/27/2018 11:27	Receive	Zevac	None
Blaze Rd-Receiver	11/1/2018 12:27	Receive	Zevac	None
Blaze Rd-Receiver	11/6/2018 13:21	Receive	Zevac	None
Blaze Rd-Receiver	11/12/2018 13:33	Receive	Zevac	None
Blaze Rd-Receiver	11/15/2018 13:41	Receive	Zevac	None
Blaze Rd-Receiver	11/20/2018 13:50	Receive	Zevac	None
Blaze Rd-Receiver	11/27/2018 12:16	Receive	Zevac	None
Blaze Rd-Receiver	12/1/2018 12:00	Receive	Zevac	None
Blaze Rd-Receiver	12/4/2018 12:16	Receive	Zevac	None
Blaze Rd-Receiver	12/8/2018 13:01	Receive	Zevac	None
Blaze Rd-Receiver	12/11/2018 12:26	Receive	Zevac	None
Blaze Rd-Receiver	12/15/2018 11:29	Receive	Zevac	None
Blaze Rd-Receiver	12/18/2018 14:54	Receive	Zevac	None
Blaze Rd-Receiver	12/22/2018 10:33	Receive	Zevac	None
Blaze Rd-Receiver	12/25/2018 10:11	Receive	Zevac	None
Blaze Rd-Receiver	12/29/2018 11:50	Receive	Zevac	None
Blaze Rd-Receiver	1/1/2019 12:03	Receive	Zevac	None
Blaze Rd-Receiver	1/5/2019 10:29	Receive	Zevac	None
Blaze Rd-Receiver	1/8/2019 12:55	Receive	Zevac	None
Clay 20"-Launcher	7/2/2018 14:29	Launch	Zevac	None
Clay 20"-Launcher	7/3/2018 15:05	Launch	Zevac	None
Clay 20"-Launcher	7/5/2018 14:35	Launch	Zevac	None
Clay 20"-Launcher	7/6/2018 16:22	Launch	Zevac	None
Clay 20"-Launcher	7/6/2018 16:32	Preload	Zevac	None
Clay 20"-Launcher	7/9/2018 14:38	Launch	Zevac	None
Clay 20"-Launcher	7/10/2018 13:51	Launch	Zevac	None
Clay 20"-Launcher	7/11/2018 12:37	Launch	Zevac	None
Clay 20"-Launcher	7/12/2018 14:19	Launch	Zevac	None
Clay 20"-Launcher	7/13/2018 16:45	Launch	Zevac	None
Clay 20"-Launcher	7/14/2018 11:28	Launch	Zevac	None
Clay 20"-Launcher	7/16/2018 13:32	Launch	Zevac	None
Clay 20"-Launcher	7/16/2018 13:45	Preload	Zevac	None

Clay 20"-Launcher	7/18/2018 14:25	Launch	Zevac	None
Clay 20"-Launcher	7/20/2018 13:40	Launch	Zevac	None
Clay 20"-Launcher	7/21/2018 5:57	Preload	Zevac	None
Clay 20"-Launcher	7/23/2018 16:00	Launch	Zevac	None
Clay 20"-Launcher	7/24/2018 14:20	Launch	Zevac	None
Clay 20"-Launcher	7/25/2018 14:19	Launch	Zevac	None
Clay 20"-Launcher	7/26/2018 15:04	Launch	Zevac	None
Clay 20"-Launcher	7/27/2018 13:45	Launch	Zevac	None
Clay 20"-Launcher	7/27/2018 16:36	Preload	Zevac	None
Clay 20"-Launcher	7/31/2018 16:03	Launch	Zevac	None
Clay 20"-Launcher	8/1/2018 14:35	Launch	Zevac	None
Clay 20"-Launcher	8/2/2018 14:36	Launch	Zevac	None
Clay 20"-Launcher	8/3/2018 14:30	Launch	Zevac	None
Clay 20"-Launcher	8/4/2018 11:46	Launch	Zevac	None
Clay 20"-Launcher	8/6/2018 14:06	Launch	Zevac	None
Clay 20"-Launcher	8/7/2018 14:11	Launch	Zevac	None
Clay 20"-Launcher	8/9/2018 14:37	Launch	Zevac	None
Clay 20"-Launcher	8/9/2018 14:40	Preload	Zevac	None
Clay 20"-Launcher	8/11/2018 10:19	Launch	Zevac	None
Clay 20"-Launcher	8/11/2018 10:47	Preload	Zevac	None
Clay 20"-Launcher	8/14/2018 13:49	Launch	Zevac	None
Clay 20"-Launcher	8/16/2018 14:24	Launch	Zevac	None
Clay 20"-Launcher	8/16/2018 14:25	Preload	Zevac	None
Clay 20"-Launcher	8/18/2018 12:40	Preload	Zevac	None
Clay 20"-Launcher	8/21/2018 15:00	Launch	Zevac	None
Clay 20"-Launcher	8/23/2018 15:48	Launch	Zevac	None
Clay 20"-Launcher	8/24/2018 12:33	Launch	Zevac	None
Clay 20"-Launcher	8/25/2018 11:35	Launch	Zevac	None
Clay 20"-Launcher	8/27/2018 13:02	Launch	Zevac	None
Clay 20"-Launcher	8/28/2018 14:23	Launch	Zevac	None
Clay 20"-Launcher	8/30/2018 14:58	Launch	Zevac	None
Clay 20"-Launcher	8/30/2018 15:14	Preload	Zevac	None
Clay 20"-Launcher	9/1/2018 13:32	Preload	Zevac	None
Clay 20"-Launcher	9/1/2018 13:31	Launch	Zevac	None
Clay 20"-Launcher	9/6/2018 17:22	Launch	Zevac	None
Clay 20"-Launcher	9/7/2018 16:06	Launch	Zevac	None
Clay 20"-Launcher	9/7/2018 15:15	Preload	Zevac	None
Clay 20"-Launcher	9/11/2018 15:00	Launch	Zevac	None
Clay 20"-Launcher	9/11/2018 15:20	Preload	Zevac	None
Clay 20"-Launcher	9/14/2018 14:20	Launch	Zevac	None
Clay 20"-Launcher	9/15/2018 12:41	Launch	Zevac	None
Clay 20"-Launcher	9/18/2018 13:22	Launch	Zevac	None
Clay 20"-Launcher	9/20/2018 15:27	Launch	Zevac	None
Clay 20"-Launcher	9/20/2018 15:28	Preload	Zevac	None
Clay 20"-Launcher	9/21/2018 13:45	LaunchAftP	Zevac	None

Clay 20"-Launcher	9/21/2018 13:40	Preload	Zevac	None
Clay 20"-Launcher	9/24/2018 13:37	Launch	Zevac	None
Clay 20"-Launcher	9/25/2018 15:09	Preload	Zevac	None
Clay 20"-Launcher	9/28/2018 14:26	Launch	Zevac	None
Clay 20"-Launcher	9/29/2018 11:53	Launch	Zevac	None
Clay 20"-Launcher	9/29/2018 12:20	Preload	Zevac	None
Clay 20"-Launcher	10/2/2018 13:44	Launch	Zevac	None
Clay 20"-Launcher	10/4/2018 16:13	Preload	Zevac	None
Clay 20"-Launcher	10/5/2018 13:53	Preload	Zevac	None
Clay 20"-Launcher	10/8/2018 16:56	Launch	Zevac	None
Clay 20"-Launcher	10/9/2018 14:14	Launch	Zevac	None
Clay 20"-Launcher	10/11/2018 15:30	Preload	Zevac	None
Clay 20"-Launcher	10/13/2018 14:54	Launch	Zevac	None
Clay 20"-Launcher	10/15/2018 13:09	Launch	Zevac	None
Clay 20"-Launcher	10/15/2018 13:40	Preload	Zevac	None
Clay 20"-Launcher	10/18/2018 16:23	Preload	Zevac	None
Clay 20"-Launcher	10/20/2018 11:05	Launch	Zevac	None
Clay 20"-Launcher	10/22/2018 12:52	Launch	Zevac	None
Clay 20"-Launcher	10/23/2018 14:33	Preload	Zevac	None
Clay 20"-Launcher	11/26/2018 12:36	Preload	Zevac	None
Clay 20"-Launcher	10/27/2018 12:51	Launch	Zevac	None
Clay 20"-Launcher	10/27/2018 14:16	Preload	Zevac	None
Clay 20"-Launcher	10/30/2018 16:31	Launch	Zevac	None
Clay 20"-Launcher	11/1/2018 14:22	Launch	Zevac	None
Clay 20"-Launcher	11/2/2018 13:16	Launch	Zevac	None
Clay 20"-Launcher	11/2/2018 13:10	Preload	Zevac	None
Clay 20"-Launcher	11/6/2018 14:45	Launch	Zevac	None
Clay 20"-Launcher	11/8/2018 14:29	Launch	Zevac	None
Clay 20"-Launcher	11/12/2018 15:52	Launch	Zevac	None
Clay 20"-Launcher	11/12/2018 16:05	Preload	Zevac	None
Clay 20"-Launcher	11/15/2018 14:45	Launch	Zevac	None
Clay 20"-Launcher	11/16/2018 13:36	Launch	Zevac	None
Clay 20"-Launcher	11/19/2018 11:58	Launch	Zevac	None
Clay 20"-Launcher	11/20/2018 16:21	Launch	Zevac	None
Clay 20"-Launcher	11/20/2018 16:22	Preload	Zevac	None
Clay 20"-Launcher	11/23/2018 10:27	Launch	Zevac	None
Clay 20"-Launcher	11/26/2018 12:36	Preload	Zevac	None
Clay 20"-Launcher	11/29/2018 14:49	Launch	Zevac	None
Clay 20"-Launcher	11/30/2018 12:36	Launch	Zevac	None
Clay 20"-Launcher	12/3/2018 17:49	Launch	Zevac	None
Clay 20"-Launcher	12/4/2018 13:21	Launch	Zevac	None
Clay 20"-Launcher	12/6/2018 14:12	Launch	Zevac	None
Clay 20"-Launcher	12/7/2018 13:54	Launch	Zevac	None
Clay 20"-Launcher	12/8/2018 15:26	Launch	Zevac	None
Clay 20"-Launcher	12/10/2018 16:51	Launch	Zevac	None

Clay 20"-Launcher	12/11/2018 14:50	Launch	Zevac	None
Clay 20"-Launcher	12/12/2018 13:58	Launch	Zevac	None
Clay 20"-Launcher	12/13/2018 15:01	Launch	Zevac	None
Clay 20"-Launcher	12/14/2018 15:11	Launch	Zevac	None
Clay 20"-Launcher	12/15/2018 12:34	Launch	Zevac	None
Clay 20"-Launcher	12/17/2018 16:04	Launch	Zevac	None
Clay 20"-Launcher	12/18/2018 15:46	Launch	Zevac	None
Clay 20"-Launcher	12/20/2018 16:02	Launch	Zevac	None
Clay 20"-Launcher	12/21/2018 14:27	Launch	Zevac	None
Clay 20"-Launcher	12/22/2018 11:41	Launch	Zevac	None
Clay 20"-Launcher	12/24/2018 14:59	Launch	Zevac	None
Clay 20"-Launcher	12/25/2018 12:03	Launch	Zevac	
Clay 20"-Launcher	12/27/2018 15:03	Launch	Zevac	None
Clay 20"-Launcher	12/28/2018 15:00	Launch	Zevac	None
Clay 20"-Launcher	12/29/2018 12:48	Launch	Zevac	None
Clay 20"-Launcher	12/31/2018 16:36	Launch	Zevac	None
Clay 20"-Launcher	1/1/2019 14:02	Launch	Zevac	None
Clay 20"-Launcher	1/3/2019 13:30	Launch	Zevac	None
Clay 20"-Launcher	1/4/2019 15:15	Launch	Zevac	None
Clay 20"-Launcher	1/5/2019 11:52	Launch	Zevac	None
Clay 20"-Launcher	1/6/2019 14:09	Launch	Zevac	None
Clay 20"-Launcher	1/7/2019 16:07	Launch	Zevac	None
Clay 20"-Launcher	1/8/2019 14:20	Launch	Zevac	None
Clay 20"-Launcher	1/9/2019 13:23	Launch	Zevac	None
Clay 20"-Receiver	7/2/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/3/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/5/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/7/2018 5:00	Receive	Zevac	None
Clay 20"-Receiver	7/10/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/13/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/16/2018 6:00	Receive	Zevac	None
Clay 20"-Receiver	7/21/2018 13:03	Receive	Zevac	None
Clay 20"-Receiver	7/24/2018 14:35	Receive	Zevac	None
Clay 20"-Receiver	7/26/2018 15:30	Receive	Zevac	None
Clay 20"-Receiver	7/28/2018 11:27	Receive	Zevac	None
Clay 20"-Receiver	7/31/2018 16:19	Receive	Zevac	None
Clay 20"-Receiver	8/2/2018 15:21	Receive	Zevac	None
Clay 20"-Receiver	8/4/2018 12:23	Receive	Zevac	None
Clay 20"-Receiver	8/7/2018 14:59	Receive	Zevac	None
Clay 20"-Receiver	8/11/2018 8:31	Receive	Zevac	None
Clay 20"-Receiver	8/14/2018 9:11	Receive	Zevac	None
Clay 20"-Receiver	8/16/2018 14:33	Receive	Zevac	None
Clay 20"-Receiver	8/20/2018 15:44	Receive	Zevac	None
Clay 20"-Receiver	8/23/2018 15:08	Receive	Zevac	None
Clay 20"-Receiver	8/25/2018 12:21	Receive	Zevac	None

Clay 20"-Receiver	8/29/2018 9:20	Receive	Zevac	None
Clay 20"-Receiver	9/1/2018 12:09	Receive	Zevac	None
Clay 20"-Receiver	9/5/2018 10:17	Receive	Zevac	None
Clay 20"-Receiver	9/7/2018 16:07	Receive	Zevac	None
Clay 20"-Receiver	9/11/2018 15:07	Receive	Zevac	None
Clay 20"-Receiver	9/14/2018 15:22	Receive	Zevac	None
Clay 20"-Receiver	9/18/2018 14:05	Receive	Zevac	None
Clay 20"-Receiver	9/21/2018 15:14	Receive	Zevac	None
Clay 20"-Receiver	9/24/2018 14:52	Receive	Zevac	None
Clay 20"-Receiver	9/25/2018 15:51	Receive	Zevac	None
Clay 20"-Receiver	9/29/2018 7:59	Receive	Zevac	None
Clay 20"-Receiver	10/1/2018 16:17	Receive	Zevac	None
Clay 20"-Receiver	10/4/2018 16:30	Receive	Zevac	None
Clay 20"-Receiver	10/9/2018 15:32	Receive	Zevac	None
Clay 20"-Receiver	10/13/2018 14:55	Receive	Zevac	None
Clay 20"-Receiver	10/16/2018 15:32	Receive	Zevac	None
Clay 20"-Receiver	10/19/2018 13:21	Receive	Zevac	None
Clay 20"-Receiver	10/22/2018 14:47	Receive	Zevac	None
Clay 20"-Receiver	10/26/2018 16:01	Receive	Zevac	None
Clay 20"-Receiver	10/31/2018 10:11	Receive	Zevac	None
Clay 20"-Receiver	11/2/2018 14:48	Receive	Zevac	None
Clay 20"-Receiver	11/6/2018 15:12	Receive	Zevac	None
Clay 20"-Receiver	11/9/2018 15:03	Receive	Zevac	None
Clay 20"-Receiver	11/13/2018 14:52	Receive	Zevac	None
Clay 20"-Receiver	11/16/2018 14:10	Receive	Zevac	None
Clay 20"-Receiver	11/20/2018 17:21	Receive	Zevac	None
Clay 20"-Receiver	11/27/2018 14:10	Receive	Zevac	None
Clay 20"-Receiver	11/30/2018 14:27	Receive	Zevac	None
Clay 20"-Receiver	12/4/2018 14:01	Receive	Zevac	None
Clay 20"-Receiver	12/7/2018 14:42	Receive	Zevac	None
Clay 20"-Receiver	12/10/2018 18:33	Receive	Zevac	None
Clay 20"-Receiver	12/12/2018 15:00	Receive	Zevac	None
Clay 20"-Receiver	12/20/2018 16:01	Receive	Zevac	None
Clay 20"-Receiver	12/22/2018 13:06	Receive	Zevac	None
Clay 20"-Receiver	12/25/2018 12:38	Receive	Zevac	None
Clay 20"-Receiver	12/28/2018 15:54	Receive	Zevac	None
Clay 20"-Receiver	12/31/2018 17:01	Receive	Zevac	None
Clay 20"-Receiver	1/3/2019 14:28	Receive	Zevac	None
Clay 20"-Receiver	1/5/2019 12:54	Receive	Zevac	None
Clay 20"-Receiver	1/7/2019 16:38	Receive	Zevac	None
Clay 20"-Receiver	1/9/2019 14:36	Receive	Zevac	None
Club Receiver	7/12/2018 11:00	Receive	Zevac	None
Club Receiver	7/26/2018 10:30	Receive	Zevac	None
Club Receiver	8/30/2018 11:18	Receive	Zevac	None
Club Receiver	9/13/2018 12:20	Receive	Zevac	None

Club Receiver	9/20/2018 14:45	Receive	Zevac	None
Club Receiver	9/27/2018 13:13	Receive	Zevac	None
Club Receiver	10/4/2018 13:10	Receive	Zevac	None
Club Receiver	10/18/2018 15:45	Receive	Zevac	None
Club Receiver	11/14/2018 14:17	Receive	Zevac	None
Club Receiver	11/29/2018 11:17	Receive	Zevac	None
Club Receiver	12/5/2018 15:00	Receive	Zevac	None
Club Receiver	12/11/2018 14:58	Receive	Zevac	None
Club Receiver	12/12/2018 13:58	Receive	Zevac	None
Club Receiver	12/14/2018 14:28	Receive	Zevac	None
Dante Road-Launcher	7/5/2018 10:36	Launch	Zevac	None
Dante Road-Launcher	7/19/2018 10:54	Launch	Zevac	None
Dante Road-Launcher	8/23/2018 10:08	Launch	Zevac	None
Dante Road-Launcher	9/13/2018 14:09	Launch	Zevac	None
Dante Road-Launcher	9/26/2018 11:32	Preload	Zevac	None
Dante Road-Launcher	10/10/2018 12:15	Launch	Zevac	None
Dante Road-Launcher	10/25/2018 14:26	Launch	Zevac	None
Dante Road-Launcher	11/15/2018 10:46	Launch	Zevac	None
Dante Road-Launcher	11/21/2018 12:29	Launch	Zevac	None
Dante Road-Launcher	12/6/2018 12:15	Launch	Zevac	None
Dante Road-Launcher	12/13/2018 12:17	Launch	Zevac	None
Dante Road-Launcher	12/14/2018 14:56	Preload	Zevac	None
Dante Road-Launcher	12/20/2018 16:06	Launch	Zevac	None
Dante Road-Launcher	12/22/2018 9:32	Launch	Zevac	None
Dante Road-Launcher	12/27/2018 16:16	Launch	Zevac	None
Dante Road-Launcher	12/30/2018 11:01	Launch	Zevac	None
Dante Road-Launcher	1/3/2019 12:32	Launch	Zevac	None
Dante Road-Launcher	1/6/2019 13:28	Launch	Zevac	None
Ferguson Receiver	7/19/2018 10:52	Receive	Zevac	None
Ferguson Receiver	8/23/2018 10:29	Receive	Zevac	None
Ferguson Receiver	9/13/2018 14:14	Receive	Zevac	None
Ferguson Receiver	9/26/2018 11:31	Receive	Zevac	None
Ferguson Receiver	10/10/2018 12:31	Receive	Zevac	None
Ferguson Receiver	10/25/2018 14:28	Receive	Zevac	None
Ferguson Receiver	11/15/2018 11:18	Receive	Zevac	None
Ferguson Receiver	11/21/2018 12:28	Receive	Zevac	None
Ferguson Receiver	12/6/2018 12:15	Receive	Zevac	None
Ferguson Receiver	12/13/2018 12:16	Receive	Zevac	None
Ferguson Receiver	12/15/2018 9:35	Receive	Zevac	None
Ferguson Receiver	12/20/2018 15:07	Receive	Zevac	None
Ferguson Receiver	12/22/2018 9:47	Receive	Zevac	None
Ferguson Receiver	12/27/2018 16:13	Receive	Zevac	None
Ferguson Receiver	12/30/2018 11:01	Receive	Zevac	None
Ferguson Receiver	1/3/2019 12:32	Receive	Zevac	None
Ferguson Receiver	1/6/2019 14:24	Receive	Zevac	None

Flesher-Launcher	7/3/2018 12:10	Launch	Zevac	None
Flesher-Launcher	7/3/2018 12:00	Preload	Zevac	None
Flesher-Launcher	7/10/2018 10:55	Launch	Zevac	None
Flesher-Launcher	7/10/2018 12:00	Preload	Zevac	None
Flesher-Launcher	7/17/2018 11:36	Preload	Zevac	None
Flesher-Launcher	7/24/2018 13:38	Launch	Zevac	None
Flesher-Launcher	7/24/2018 12:00	Preload	Zevac	None
Flesher-Launcher	7/31/2018 11:04	Launch	Zevac	None
Flesher-Launcher	7/31/2018 12:00	Preload	Zevac	None
Flesher-Launcher	8/7/2018 11:34	Launch	Zevac	None
Flesher-Launcher	8/7/2018 12:00	Preload	Zevac	None
Flesher-Launcher	8/14/2018 10:31	Launch	Zevac	None
Flesher-Launcher	8/14/2018 12:00	Preload	Zevac	None
Flesher-Launcher	8/21/2018 13:29	Launch	Zevac	None
Flesher-Launcher	8/21/2018 13:30	Preload	Zevac	None
Flesher-Launcher	8/28/2018 14:57	Preload	Zevac	None
Flesher-Launcher	8/28/2018 10:59	Launch	Zevac	None
Flesher-Launcher	9/4/2018 12:42	Preload	Zevac	None
Flesher-Launcher	9/4/2018 12:08	Launch	Zevac	None
Flesher-Launcher	9/11/2018 11:39	Launch	Zevac	None
Flesher-Launcher	9/11/2018 12:00	Preload	Zevac	None
Flesher-Launcher	9/18/2018 11:17	Launch	Zevac	None
Flesher-Launcher	9/18/2018 12:00	Preload	Zevac	None
Flesher-Launcher	9/25/2018 11:34	Launch	Zevac	None
Flesher-Launcher	9/25/2018 11:37	Preload	Zevac	None
Flesher-Launcher	10/2/2018 11:08	Launch	Zevac	None
Flesher-Launcher	10/2/2018 12:00	Preload	Zevac	None
Flesher-Launcher	10/9/2018 11:12	Launch	Zevac	None
Flesher-Launcher	10/9/2018 11:17	Preload	Zevac	None
Flesher-Launcher	10/15/2018 9:41	Preload	Zevac	None
Flesher-Launcher	10/17/2018 12:41	Preload	Zevac	None
Flesher-Launcher	10/23/2018 14:32	Preload	Zevac	None
Flesher-Launcher	10/30/2018 13:43	Launch	Zevac	None
Flesher-Launcher	10/30/2018 14:10	Preload	Zevac	None
Flesher-Launcher	11/7/2018 12:20	Launch	Zevac	None
Flesher-Launcher	11/7/2018 12:00	Preload	Zevac	None
Flesher-Launcher	11/13/2018 11:22	Launch	Zevac	None
Flesher-Launcher	11/13/2018 12:00	Preload	Zevac	None
Flesher-Launcher	11/20/2018 12:49	Preload	Zevac	None
Flesher-Launcher	11/20/2018 12:17	Launch	Zevac	None
Flesher-Launcher	11/27/2018 11:37	Launch	Zevac	None
Flesher-Launcher	11/27/2018 12:10	Preload	Zevac	None
Flesher-Launcher	12/4/2018 11:33	Preload	Zevac	None
Flesher-Launcher	12/12/2018 9:25	Launch	Zevac	None
Flesher-Launcher	12/12/2018 10:04	Preload	Zevac	None

Flesher-Launcher	12/18/2018 14:58	Preload	Zevac	None
Flesher-Launcher	12/26/2018 10:39	Launch	Zevac	None
Flesher-Launcher	12/26/2018 12:00	Preload	Zevac	None
Flesher-Launcher	1/2/2019 12:49	Launch	Zevac	None
Flesher-Launcher	1/2/2019 12:45	Preload	Zevac	None
Flesher-Launcher	1/9/2019 10:33	Launch	Zevac	None
Flesher-Launcher	1/9/2019 10:33	Preload	Zevac	None
Flesher-Receiver	7/2/2018 6:00	Receive	Zevac	None
Flesher-Receiver	7/9/2018 6:00	Receive	Zevac	None
Flesher-Receiver	7/16/2018 6:00	Receive	Zevac	None
Flesher-Receiver	7/23/2018 22:35	Receive	Zevac	None
Flesher-Receiver	7/30/2018 9:23	Receive	Zevac	None
Flesher-Receiver	8/6/2018 10:28	Receive	Zevac	None
Flesher-Receiver	8/13/2018 9:25	Receive	Zevac	None
Flesher-Receiver	8/20/2018 11:04	Receive	Zevac	None
Flesher-Receiver	8/27/2018 9:33	Receive	Zevac	None
Flesher-Receiver	9/4/2018 11:01	Receive	Zevac	None
Flesher-Receiver	9/10/2018 13:05	Receive	Zevac	None
Flesher-Receiver	9/17/2018 10:52	Receive	Zevac	None
Flesher-Receiver	9/24/2018 10:41	Receive	Zevac	None
Flesher-Receiver	10/1/2018 10:37	Receive	Zevac	None
Flesher-Receiver	10/8/2018 12:16	Receive	Zevac	None
Flesher-Receiver	10/15/2018 12:06	Receive	Zevac	None
Flesher-Receiver	10/22/2018 11:29	Receive	Zevac	None
Flesher-Receiver	10/30/2018 12:53	Receive	Zevac	None
Flesher-Receiver	11/5/2018 9:49	Receive	Zevac	None
Flesher-Receiver	11/13/2018 9:38	Receive	Zevac	None
Flesher-Receiver	11/19/2018 10:36	Receive	Zevac	None
Flesher-Receiver	11/26/2018 9:53	Receive	Zevac	None
Flesher-Receiver	12/3/2018 10:47	Receive	Zevac	None
Flesher-Receiver	12/10/2018 12:11	Receive	Zevac	None
Flesher-Receiver	12/17/2018 10:49	Receive	Zevac	None
Flesher-Receiver	12/24/2018 9:17	Receive	Zevac	None
Flesher-Receiver	12/31/2018 10:22	Receive	Zevac	None
Flesher-Receiver	1/7/2019 10:59	Receive	Zevac	None
Guernsey 20"-Launcher	7/3/2018 12:55	Launch	Zevac	None
Guernsey 20"-Launcher	7/5/2018 12:10	Launch	Zevac	None
Guernsey 20"-Launcher	7/7/2018 11:31	Launch	Zevac	None
Guernsey 20"-Launcher	7/10/2018 11:29	Launch	Zevac	None
Guernsey 20"-Launcher	7/12/2018 15:28	Preload	Zevac	None
Guernsey 20"-Launcher	7/17/2018 11:56	Launch	Zevac	None
Guernsey 20"-Launcher	7/19/2018 12:15	Launch	Zevac	None
Guernsey 20"-Launcher	7/21/2018 10:32	Launch	Zevac	None
Guernsey 20"-Launcher	7/24/2018 12:30	Launch	Zevac	None
Guernsey 20"-Launcher	7/26/2018 13:47	Launch	Zevac	None

Guernsey 20"-Launcher	7/26/2018 13:50	Preload	Zevac	None
Guernsey 20"-Launcher	7/31/2018 14:15	Launch	Zevac	None
Guernsey 20"-Launcher	8/2/2018 13:15	Launch	Zevac	None
Guernsey 20"-Launcher	8/4/2018 10:41	Launch	Zevac	None
Guernsey 20"-Launcher	8/7/2018 13:08	Launch	Zevac	None
Guernsey 20"-Launcher	8/9/2018 11:54	Launch	Zevac	None
Guernsey 20"-Launcher	8/9/2018 12:03	Preload	Zevac	None
Guernsey 20"-Launcher	8/14/2018 12:55	Launch	Zevac	None
Guernsey 20"-Launcher	8/16/2018 11:32	Launch	Zevac	None
Guernsey 20"-Launcher	8/18/2018 10:07	Launch	Zevac	None
Guernsey 20"-Launcher	8/18/2018 10:08	Preload	Zevac	None
Guernsey 20"-Launcher	8/23/2018 12:53	Launch	Zevac	None
Guernsey 20"-Launcher	8/25/2018 9:21	Launch	Zevac	None
Guernsey 20"-Launcher	8/28/2018 12:46	Launch	Zevac	None
Guernsey 20"-Launcher	8/30/2018 12:54	Launch	Zevac	None
Guernsey 20"-Launcher	9/1/2018 11:03	Launch	Zevac	None
Guernsey 20"-Launcher	9/1/2018 11:28	Preload	Zevac	None
Guernsey 20"-Launcher	9/6/2018 14:40	Launch	Zevac	None
Guernsey 20"-Launcher	9/6/2018 14:41	Preload	Zevac	None
Guernsey 20"-Launcher	9/11/2018 12:56	Preload	Zevac	None
Guernsey 20"-Launcher	9/15/2018 10:46	Launch	Zevac	None
Guernsey 20"-Launcher	9/18/2018 12:18	Preload	Zevac	None
Guernsey 20"-Launcher	9/18/2018 7:00	LaunchAftP	Zevac	None
Guernsey 20"-Launcher	9/20/2018 12:48	Preload	Zevac	None
Guernsey 20"-Launcher	9/25/2018 14:23	Launch	Zevac	None
Guernsey 20"-Launcher	9/25/2018 13:28	Preload	Zevac	None
Guernsey 20"-Launcher	9/29/2018 9:58	Launch	Zevac	None
Guernsey 20"-Launcher	9/29/2018 9:59	Preload	Zevac	None
Guernsey 20"-Launcher	10/4/2018 13:29	Preload	Zevac	None
Guernsey 20"-Launcher	10/9/2018 13:30	Launch	Zevac	None
Guernsey 20"-Launcher	10/11/2018 14:21	Launch	Zevac	None
Guernsey 20"-Launcher	10/13/2018 11:21	Launch	Zevac	None
Guernsey 20"-Launcher	10/13/2018 11:55	Preload	Zevac	None
Guernsey 20"-Launcher	10/18/2018 14:47	Launch	Zevac	None
Guernsey 20"-Launcher	10/18/2018 15:00	Preload	Zevac	None
Guernsey 20"-Launcher	10/23/2018 12:14	Preload	Zevac	None
Guernsey 20"-Launcher	10/27/2018 11:26	Launch	Zevac	None
Guernsey 20"-Launcher	10/30/2018 15:09	Launch	Zevac	None
Guernsey 20"-Launcher	11/1/2018 12:56	Launch	Zevac	None
Guernsey 20"-Launcher	11/1/2018 12:56	Preload	Zevac	None
Guernsey 20"-Launcher	11/6/2018 13:22	Launch	Zevac	None
Guernsey 20"-Launcher	11/8/2018 12:27	Preload	Zevac	None
Guernsey 20"-Launcher	11/8/2018 11:37	Launch	Zevac	None
Guernsey 20"-Launcher	11/12/2018 13:34	Preload	Zevac	None
Guernsey 20"-Launcher	11/15/2018 13:42	Launch	Zevac	None

Guernsey 20"-Launcher	11/17/2018 10:52	Launch	Zevac	None
Guernsey 20"-Launcher	11/20/2018 13:50	Launch	Zevac	None
Guernsey 20"-Launcher	11/20/2018 13:51	Preload	Zevac	None
Guernsey 20"-Launcher	11/24/2018 9:59	Launch	Zevac	None
Guernsey 20"-Launcher	11/27/2018 12:17	Launch	Zevac	None
Guernsey 20"-Launcher	11/29/2018 12:28	Launch	Zevac	None
Guernsey 20"-Launcher	12/1/2018 12:01	Launch	Zevac	None
Guernsey 20"-Launcher	12/3/2018 16:00	Launch	Zevac	None
Guernsey 20"-Launcher	12/4/2018 12:17	Launch	Zevac	None
Guernsey 20"-Launcher	12/5/2018 18:29	Launch	Zevac	None
Guernsey 20"-Launcher	12/6/2018 11:53	Launch	Zevac	None
Guernsey 20"-Launcher	12/8/2018 13:00	Launch	Zevac	None
Guernsey 20"-Launcher	12/10/2018 14:12	Launch	Zevac	None
Guernsey 20"-Launcher	12/11/2018 12:27	Launch	Zevac	None
Guernsey 20"-Launcher	12/13/2018 12:59	Launch	Zevac	None
Guernsey 20"-Launcher	12/15/2018 11:30	Launch	Zevac	None
Guernsey 20"-Launcher	12/17/2018 14:18	Launch	Zevac	None
Guernsey 20"-Launcher	12/18/2018 14:55	Launch	Zevac	None
Guernsey 20"-Launcher	12/20/2018 12:21	Launch	Zevac	None
Guernsey 20"-Launcher	12/22/2018 10:33	Launch	Zevac	None
Guernsey 20"-Launcher	12/24/2018 14:03	Launch	Zevac	None
Guernsey 20"-Launcher	12/25/2018 10:12	Launch	Zevac	None
Guernsey 20"-Launcher	12/27/2018 12:35	Launch	Zevac	None
Guernsey 20"-Launcher	12/29/2018 11:51	Launch	Zevac	None
Guernsey 20"-Launcher	12/31/2018 15:21	Launch	Zevac	None
Guernsey 20"-Launcher	1/1/2019 12:04	Launch	Zevac	None
Guernsey 20"-Launcher	1/3/2019 11:32	Launch	Zevac	None
Guernsey 20"-Launcher	1/5/2019 10:49	Launch	Zevac	None
Guernsey 20"-Launcher	1/7/2019 13:45	Launch	Zevac	None
Guernsey 20"-Launcher	1/8/2019 12:55	Launch	Zevac	None
Guernsey 20"-Receiver	7/3/2018 6:00	Receive	Zevac	None
Guernsey 20"-Receiver	7/5/2018 6:00	Receive	Zevac	None
Guernsey 20"-Receiver	7/14/2018 5:00	Receive	Zevac	None
Guernsey 20"-Receiver	7/21/2018 11:51	Receive	Zevac	None
Guernsey 20"-Receiver	7/26/2018 15:04	Receive	Zevac	None
Guernsey 20"-Receiver	7/31/2018 16:04	Receive	Zevac	None
Guernsey 20"-Receiver	8/4/2018 11:45	Receive	Zevac	None
Guernsey 20"-Receiver	8/9/2018 14:38	Receive	Zevac	None
Guernsey 20"-Receiver	8/14/2018 13:50	Receive	Zevac	None
Guernsey 20"-Receiver	8/18/2018 12:40	Receive	Zevac	None
Guernsey 20"-Receiver	8/23/2018 15:48	Receive	Zevac	None
Guernsey 20"-Receiver	8/25/2018 10:55	Receive	Zevac	None
Guernsey 20"-Receiver	8/30/2018 14:29	Receive	Zevac	None
Guernsey 20"-Receiver	9/1/2018 13:00	Receive	Zevac	None
Guernsey 20"-Receiver	9/11/2018 14:19	Receive	Zevac	None

Guernsey 20"-Receiver	9/15/2018 12:41	Receive	Zevac	None
Guernsey 20"-Receiver	9/20/2018 15:25	Receive	Zevac	None
Guernsey 20"-Receiver	9/25/2018 15:06	Receive	Zevac	None
Guernsey 20"-Receiver	9/29/2018 11:05	Receive	Zevac	None
Guernsey 20"-Receiver	10/4/2018 15:47	Receive	Zevac	None
Guernsey 20"-Receiver	10/9/2018 14:14	Receive	Zevac	None
Guernsey 20"-Receiver	10/13/2018 13:09	Receive	Zevac	None
Guernsey 20"-Receiver	10/18/2018 16:23	Receive	Zevac	None
Guernsey 20"-Receiver	10/23/2018 14:31	Receive	Zevac	None
Guernsey 20"-Receiver	10/27/2018 12:49	Receive	Zevac	None
Guernsey 20"-Receiver	11/1/2018 14:21	Receive	Zevac	None
Guernsey 20"-Receiver	11/6/2018 14:47	Receive	Zevac	None
Guernsey 20"-Receiver	11/12/2018 14:59	Receive	Zevac	None
Guernsey 20"-Receiver	11/15/2018 14:44	Receive	Zevac	None
Guernsey 20"-Receiver	11/20/2018 16:20	Receive	Zevac	None
Guernsey 20"-Receiver	11/26/2018 11:53	Receive	Zevac	None
Guernsey 20"-Receiver	11/29/2018 14:49	Receive	Zevac	None
Guernsey 20"-Receiver	12/3/2018 17:50	Receive	Zevac	None
Guernsey 20"-Receiver	12/6/2018 14:11	Receive	Zevac	None
Guernsey 20"-Receiver	12/10/2018 16:50	Receive	Zevac	None
Guernsey 20"-Receiver	12/13/2018 15:00	Receive	Zevac	None
Guernsey 20"-Receiver	12/17/2018 16:04	Receive	Zevac	None
Guernsey 20"-Receiver	12/20/2018 16:02	Receive	Zevac	None
Guernsey 20"-Receiver	12/24/2018 15:23	Receive	Zevac	None
Guernsey 20"-Receiver	12/27/2018 14:22	Receive	Zevac	None
Guernsey 20"-Receiver	12/31/2018 16:36	Receive	Zevac	None
Guernsey 20"-Receiver	1/3/2019 13:31	Receive	Zevac	None
Guernsey 20"-Receiver	1/7/2019 15:16	Receive	Zevac	None
Heavilin to Yoder-Receiver	7/31/2018 10:39	Receive	Zevac	None
Neff-Launcher	7/2/2018 12:53	Launch	Zevac	None
Neff-Launcher	7/2/2018 13:20	Preload	Zevac	None
Neff-Launcher	7/9/2018 13:58	Preload	Zevac	None
Neff-Launcher	7/16/2018 15:01	Launch	Zevac	None
Neff-Launcher	7/16/2018 15:00	Preload	Zevac	None
Neff-Launcher	7/23/2018 16:00	Launch	Zevac	None
Neff-Launcher	7/23/2018 17:00	Preload	Zevac	None
Neff-Launcher	7/30/2018 12:00	Launch	Zevac	None
Neff-Launcher	7/30/2018 12:30	Preload	Zevac	None
Neff-Launcher	8/6/2018 11:56	Launch	Zevac	None
Neff-Launcher	8/6/2018 14:38	Preload	Zevac	None
Neff-Launcher	8/13/2018 14:05	Launch	Zevac	None
Neff-Launcher	8/13/2018 14:35	Preload	Zevac	None
Neff-Launcher	8/20/2018 12:40	Launch	Zevac	None
Neff-Launcher	8/20/2018 12:42	Preload	Zevac	None
Neff-Launcher	8/27/2018 11:09	Launch	Zevac	None

Neff-Launcher	8/27/2018 11:35	Preload	Zevac	None
Neff-Launcher	9/4/2018 14:14	Preload	Zevac	None
Neff-Launcher	9/4/2018 13:42	Launch	Zevac	None
Neff-Launcher	9/10/2018 14:15	Launch	Zevac	None
Neff-Launcher	9/10/2018 14:35	Preload	Zevac	None
Neff-Launcher	10/15/2018 13:26	Launch	Zevac	None
Neff-Launcher	10/15/2018 13:50	Preload	Zevac	None
Neff-Launcher	10/22/2018 14:52	Preload	Zevac	None
Neff-Launcher	10/30/2018 15:10	Launch	Zevac	None
Neff-Launcher	10/30/2018 15:40	Preload	Zevac	None
Neff-Launcher	11/5/2018 12:56	Preload	Zevac	None
Neff-Launcher	11/13/2018 12:06	Launch	Zevac	None
Neff-Launcher	11/13/2018 12:35	Preload	Zevac	None
Neff-Launcher	11/20/2018 15:28	Preload	Zevac	None
Neff-Launcher	11/20/2018 13:55	Launch	Zevac	None
Neff-Launcher	11/26/2018 11:56	Launch	Zevac	None
Neff-Launcher	11/26/2018 13:20	Preload	Zevac	None
Neff-Launcher	12/3/2018 13:41	Preload	Zevac	None
Neff-Launcher	12/10/2018 16:09	Launch	Zevac	None
Neff-Launcher	12/10/2018 16:10	Preload	Zevac	None
Neff-Launcher	12/17/2018 14:23	Preload	Zevac	None
Neff-Launcher	12/24/2018 11:27	Launch	Zevac	None
Neff-Launcher	12/24/2018 12:00	Preload	Zevac	None
Neff-Launcher	12/31/2018 12:17	Launch	Zevac	None
Neff-Launcher	1/4/2019 14:41	Launch	Zevac	None
Neff-Launcher	1/7/2019 12:52	Launch	Zevac	None
Neff-Launcher	1/7/2019 12:53	Preload	Zevac	None
Neff-Receiver	7/2/2018 6:00	Receive	Zevac	None
Neff-Receiver	7/9/2018 6:00	Receive	Zevac	None
Neff-Receiver	7/16/2018 6:00	Receive	Zevac	None
Neff-Receiver	7/23/2018 22:35	Receive	Zevac	None
Neff-Receiver	7/30/2018 9:59	Receive	Zevac	None
Neff-Receiver	8/6/2018 10:27	Receive	Zevac	None
Neff-Receiver	8/13/2018 10:12	Receive	Zevac	None
Neff-Receiver	8/20/2018 11:04	Receive	Zevac	None
Neff-Receiver	8/27/2018 9:32	Receive	Zevac	None
Neff-Receiver	9/4/2018 11:01	Receive	Zevac	None
Neff-Receiver	9/10/2018 11:40	Receive	Zevac	None
Neff-Receiver	9/17/2018 10:53	Receive	Zevac	None
Neff-Receiver	10/22/2018 11:30	Receive	Zevac	None
Neff-Receiver	10/30/2018 12:27	Receive	Zevac	None
Neff-Receiver	11/5/2018 10:39	Receive	Zevac	None
Neff-Receiver	11/13/2018 10:31	Receive	Zevac	None
Neff-Receiver	11/20/2018 10:43	Receive	Zevac	None
Neff-Receiver	11/26/2018 9:53	Receive	Zevac	None

Neff-Receiver	12/3/2018 10:48	Receive	Zevac	None
Neff-Receiver	12/10/2018 12:12	Receive	Zevac	None
Neff-Receiver	12/17/2018 10:49	Receive	Zevac	None
Neff-Receiver	12/24/2018 9:18	Receive	Zevac	None
Neff-Receiver	12/31/2018 10:22	Receive	Zevac	None
Neff-Receiver	1/7/2019 10:59	Receive	Zevac	None
Scott Hill to Harrison West-Launcher	10/1/2018 16:03	Receive	Zevac	None
Scott Hill to Harrison West-Launcher	10/19/2018 13:25	Launch	Zevac	None
Scott Hill to Harrison West-Launcher	1/4/2019 11:15	Receive	Zevac	None
Scott Hill to Harrison West-Launcher	1/7/2019 10:27	Receive	Zevac	None
Scott Hill to Harrison West-Launcher	1/9/2019 10:09	Receive	Zevac	None
Scott Hill to Harrison West-Receiver	10/1/2018 16:17	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/3/2018 14:44	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/8/2018 15:40	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/10/2018 15:01	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/15/2018 15:16	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/22/2018 14:17	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	10/24/2018 13:06	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	11/7/2018 15:33	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	11/12/2018 10:07	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/10/2018 18:34	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/12/2018 9:42	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/17/2018 9:55	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/19/2018 10:46	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/21/2018 9:25	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/26/2018 8:44	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	12/28/2018 10:31	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	1/4/2019 9:26	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	1/7/2019 8:53	Launch	Zevac	None
Scott Hill to Harrison West-Receiver	1/9/2019 9:14	Launch	Zevac	None
Scott Hill to Yoder-Launcher	1/2/2019 10:52	Launch	Zevac	None
Scott Hill to Yoder-Launcher	1/4/2019 11:15	Launch	Zevac	None
Scott Hill to Yoder-Launcher	1/7/2019 10:49	Launch	Zevac	None
Scott Hill to Yoder-Launcher	1/9/2019 10:35	Launch	Zevac	None
Harrison West to Cadiz-Launcher	10/1/2018 16:15	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/2/2018 14:16	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/3/2018 14:44	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/4/2018 16:31	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/5/2018 14:35	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/8/2018 15:38	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/9/2018 15:32	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/10/2018 15:01	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/12/2018 14:49	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/13/2018 15:08	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/15/2018 16:13	Launch	Jumper	Zevac

Harrison West to Cadiz-Launcher	10/16/2018 13:47	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/17/2018 11:16	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/18/2018 9:00	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/19/2018 13:22	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/20/2018 11:45	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/22/2018 15:13	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/23/2018 15:23	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/24/2018 13:42	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/26/2018 16:00	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/27/2018 14:49	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/30/2018 17:10	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	10/31/2018 9:35	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/1/2018 14:51	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/2/2018 14:47	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/3/2018 11:41	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/5/2018 15:55	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/7/2018 15:32	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/9/2018 15:04	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/12/2018 9:47	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/13/2018 14:53	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/14/2018 12:55	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/20/2018 17:22	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/21/2018 13:23	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	11/30/2018 9:26	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/4/2018 8:45	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/6/2018 8:52	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/8/2018 8:13	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/10/2018 9:49	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/11/2018 9:16	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/12/2018 9:43	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/17/2018 9:54	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/18/2018 9:22	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/19/2018 10:45	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/20/2018 8:50	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/21/2018 9:25	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/22/2018 13:07	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/24/2018 8:24	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/26/2018 9:14	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/27/2018 9:02	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/28/2018 10:32	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	12/31/2018 9:22	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	1/2/2019 9:08	Launch	Jumper	Zevac
Harrison West to Cadiz-Launcher	1/9/2019 8:52	Launch	Jumper	Zevac