

COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Southwest Regional Office

MEMO

TO Air Quality Permit File PA-63-00968A

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DATE December 13, 2012

RE Review of Plan Approval Application
Natural Gas Compressor Station
MarkWest Liberty Midstream and Resources, LLC
Smith Compressor Station
Smith Township, Washington County
APS # 784598, Auth # 932841, PF # 747437

BACKGROUND

MarkWest Liberty Midstream and Resources, LLC ("MarkWest") has submitted a plan approval application on June 28, 2012, to install and begin temporary operation of eight new natural gas-fired compressor engines and increase the tri ethylene glycol dehydrator throughput at its Smith Compressor Station ("Smith") located in Smith Township, Washington County. Natural gas will be drawn from upstream wells, dewatered, compressed, and then discharged to a processing plant before being sent to a transmission pipeline. This site is located in a wooded area off of Point Pleasant Road and approximately 1 mile southeast of Hillman State Park. MarkWest proposes to install the following sources and make the following changes under PA-63-00968A authorization at this site:

- Eight (8) Waukesha, Model No. P9390GSI, rich-burn spark ignition natural gas-fired engines, 1,980 bhp @ 1,200 rpm; controlled by Johnson Matthey, Model No. QXH-O-90-Quad (or equivalent), NSCR units; regulated by Altronic EPC-100 (or equivalent), automatic air/fuel ratio controllers.
- Increase throughput of one (1) tri ethylene glycol dehydrator, 130 MMscf/day (previously 40 MMscf/day); equipped with flash tank and flash gas recycle/recompression; regenerator controlled by a SFI 48" enclosed flare (or equivalent), rated at 2.1 MMBtu/hr.

The following sources are currently authorized for installation and operation under GP5-63-00968 and GP9-63-00968:

- Two (2) Waukesha, Model No. L7042GSI, rich-burn spark ignition natural gas-fired engines, 1,480 bhp @ 1,200 rpm; controlled by Johnson Matthey, Model No. QXH-80-T-CS-EI-12 (or equivalent), NSCR units; regulated by integrated ESM (or equivalent), automatic air/fuel ratio controllers.
- One (1) tri ethylene glycol dehydrator, 40 MMSCF/day; equipped with flash tank and flash gas recycle/recompression; controlled by a SFI 48" enclosed flare (or equivalent), rated at 2.1 MMBtu/hr.
- One (1) natural gas-fired reboiler, 2.0 MMBtu/hr.
- One (1) gunbarrel separator tank, 500 bbl capacity, controlled by a Hy-Bon (or equivalent) vapor recovery unit designed for 100% capture.
- Four (4) condensate tanks, 400 bbl capacity each; controlled by a Hy-Bon (or equivalent) vapor recovery unit designed for 100% capture.
- Two (2) John Deere, Model No. 6068HF285, diesel-fired generators, 197 bhp @ 1,800 rpm; controlled by Miratech, Model No. IQ-12-05-L1, oxidation catalysts.

This application was originally submitted to the Department on June 28, 2012, requesting installation of nine engines and the increased facility gas throughput. On July 5, 2012, this application was determined to be lacking the required proof of municipal notification from Smith Township and a completed Air Pollution Control Act Compliance Review Supplemental Form, and an administrative incompleteness letter was sent to the applicant. The required proof of notification and Compliance Review Supplemental Form were received on July 23, 2012, and a letter of administrative completeness was sent to the applicant on the same day. Additional technical information including flow diagrams and emissions calculations was requested via email sent to Mark West Sr. Environmental Engineer, Nathan Wheldon, on November 13, 2012. All requested information was received from the applicant by November 14, 2012.

REGULATORY ANALYSIS

Per 25 Pa. Code Section 127.1, new sources shall control emissions to the maximum extent, consistent with the best available technology (BAT) as determined by the Department as of the date of issuance of the plan approval for the new source. The proposed Waukesha P9390GSI compressor engines and the tri ethylene glycol dehydrator meet the definition of new sources as defined by 25 Pa. Code Section 121.1. The dehydrator is currently under construction and authorized under GP5-63-00968 for a throughput of 40 MMscf/day. The currently authorized dehydrator is capable of accommodating the additional throughput without physical change to the unit.

Installation of the proposed engines could not be authorized under the Department's GP-5 for Natural Gas, Coal Bed Methane or GOB Gas Production or Recovery Facilities. Per Condition 2 of the GP-5, "Any internal combustion engine with a rated capacity equal to or greater than 1,500 bhp may not be installed under this General Permit." The proposed Waukesha P9390GSI compressor engines are rated at 1,980 bhp each.

The P9390GSI engines could not be authorized under the GP-5, however, they are similar to those sources for which GP-5 BAT requirements are the most appropriate. Review of the application has been performed using GP-5 BAT as a reference.

Per 25 Pa. Code Section 127.11, approval is required to allow the construction of an air contamination source.

25 Pa. Code Sections 123.1, 123.2 relating to fugitive emissions and 123.31 relating to malodors apply to this facility and have been included as plan approval conditions.

Per 25 Pa. Code Section 123.13(c)(1)(i), no person may permit the emission into the outdoor atmosphere of particulate matter from a process... in a manner that the concentration of particulate matter in the effluent gas exceeds 0.04 grain per dry standard cubic foot, when the effluent gas volume is less than 150,000 dry standard cubic feet per minute. The proposed engines qualify as a "process" because they do not qualify as combustion units by definition under 25 Pa. Code Section 121.1, and will be in compliance with this emission limitation through the combustion of only natural gas.

Per 25 Pa. Code Section 123.21, no person may permit the emission into the outdoor atmosphere of sulfur oxides from a source in a manner that the concentration of the sulfur oxides, expressed as SO₂, in the effluent gas exceeds 500 parts per million, by volume, dry basis. The proposed engines will be in compliance with this emission limitation through the combustion of only natural gas.

Per 25 Pa. Code Section 123.41, visible air emissions are limited to less than 20% opacity in any three minute period in any hour and to less than 60% at any time. GP-5 BAT requirements however limit visible air emissions for internal combustion engines to less than 10% opacity in any three minute period in any hour and to less than 30% at any time. The more stringent BAT requirement has been included as a plan approval condition.

25 Pa. Code Section 129.57 relating to above ground storage tanks with a capacity greater than or equal to 2,000 gallons and less than 40,000 gallons which contain volatile organic compounds with a vapor pressure greater than 1.5 psia under actual storage conditions does not apply to the four 400 bbl (16,800 gallon) capacity condensate tanks identified in the above section. These tanks are used to store naturally occurring hydrocarbon liquids (condensate) prior to lease custody transfer. 25 Pa. Code Section 129.57 may apply to the 500 bbl (21,000 gallon) capacity gunbarrel separation tank because it will contain a waste liquid (brine) in addition to condensate. However, brine has a low vapor pressure and each tank, including the condensate tanks, will be controlled by a vapor recovery unit. Use of a vapor recovery unit meets the more stringent requirements of 25 Pa. Code Section 129.56 that would be required for storage tanks with a capacity greater than 40,000 if those requirements were applicable.

New Source Performance Standards (NSPS) from 40 CFR Part 60 Subpart KKK – Standards of Performance for Equipment Leaks of VOC From Onshore Natural Gas Processing Plants does not apply to this facility. Per 40 CFR 60.630(a)(1), "The provisions of this subpart apply to affected facilities in onshore natural gas processing plants that commenced

construction, reconstruction, or modification after January 20, 1984.” Natural gas processing plant (gas plant) is defined under 40 CFR 60.631 as any processing site engaged in the extraction of natural gas liquids (NGLs; defined as hydrocarbons, such as ethane, propane, butane, and pentane) from field gas, fractionation of mixed natural gas liquids to natural gas products, or both. According to the background document for Subpart KKK, *extraction* implies application of a forced process (e.g., refrigeration) to the gas to remove NGLs, and was intended to exclude passive separation of NGLs from field gas due to temperature or pressure changes as the gas is transported from the underground reserve to the surface, or temperature or pressure changes as the gas passes through a process vessel located at the surface. Compressors in VOC or wet gas service are also affected facilities, where *in wet gas service* means that a piece of equipment contains or contacts the field gas before the extraction step in the process (which would imply that natural gas liquids extraction equipment is incorporated at the same facility). The group of all equipment except compressors within a process unit (defined as the equipment assembled for the extraction of natural gas liquids from field gas; the fractionation of the liquids into natural gas products; or other operations associated with the processing of natural gas products) is also an affected facility. By definition, this facility is not a natural gas processing plant; does not incorporate compressors in VOC or wet gas service; is not a compressor station, dehydration unit, or field gas gathering system located at a natural gas processing plant; and does not contain any affected facilities as noted above, and therefore, is not an affected facility and not subject to 40 CFR Part 60 Subpart KKK.

NSPS from 40 CFR Part 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition (SI) Internal Combustion Engines (ICE) applies to the eight P9390GSI engines proposed in this application and the two L7042GSI engines already authorized for installation. Per 40 CFR 60.4230(a)(4)(i), this subpart applies to owners or operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured on or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 bhp. All compressor engines will be installed after June 12, 2006, and will have been manufactured after July 1, 2010 (exact date to be determined). Each engine will be required to meet most stringent emission limitations applicable as of July 1, 2010. Applicable conditions include maintenance, recordkeeping, and performance testing requirements; engine emission limitations; EPA notification; and applicable NSPS General Provisions. The applicable Federal emission limitations are superseded by more stringent applicant-proposed emission limits.

Table 1: Natural Gas Compressor Engines NSPS JJJJ Applicability and Limits

Stationary SI ICE	Manufacture Date	Installation Date	NSPS JJJJ Applicable	NO _x (g/bhp-hr)	CO (g/bhp-hr)	VOC (g/bhp-hr)
Engines #1-2 L7042GSI	> 07/01/2010	> 11/28/2012	Yes	1.0	2.0	0.7
Engines #3-10 P9390GSI	> 07/01/2010	> 11/28/2012	Yes	1.0	2.0	0.7

Per 40 CFR 60.4243(b)(2)(ii), “...an owner or operator of a stationary SI internal combustion engine greater than 500 HP... must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance [with NO_x, CO, and VOC limits of NSPS JJJJ Table 1].” GP-5

Condition 16.b.ii. applies performance testing requirements to new internal combustion engines with a rated capacity greater than 500 bhp but no greater than 1,500 bhp. Per GP-5 Condition 16.b.ii., compliance with the natural gas-fired engine emission limitations [NO_x, CO, VOC] shall be demonstrated by performing stack testing in accordance with 25 Pa. Code Chapter 139, or testing with a Department-approved portable analyzer, within one hundred eighty (180) days after issuance of the General Permit. Also, within twelve (12) months of the initial stack testing, and on an annual basis afterwards, portable analyzer testing for NO_x will be required on the engine. While each P9390GSI engine is rated at 1,980 bhp, testing requirements will be at least as stringent as this.

Initial performance testing will only be required within 180 days of startup of the engines because this plan approval gives authorization to install for a period of 18 months. The engines may or may not be installed within 180 days of issuance of the plan approval and time must be allowed for scheduling and performing the required tests. The most stringent engine testing requirements are summarized below and will be included as plan approval conditions.

- Initial NO_x, CO, VOC compliance test within 180 days of startup of each compressor engine.
- Subsequent NO_x testing on an annual basis as specified in GP-5 Condition 16.b.ii.
- Subsequent CO testing each time NO_x testing is performed, as directed by the Department's Source Testing Section.
- Subsequent VOC testing by the shorter of every 8,760 hours of operation or 3 years as specified in NSPS JJJJ.

Per 40 CFR 60.4244(b), "You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in [40 CFR 60.8(c)]..." Additionally, per 40 CFR 60.8(c), "Operation during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard." Each compressor engine shall be exempt from emission limitations during periods of startup, shutdown, or malfunction.

Emission rates for the P9390GSI engines from the manufacturer are expressed in units of g/bhp-hr at the maximum rated bhp and speed of the engines. In consideration of GP5 Condition 13.b.iv., "At operating conditions less than rated capacity, internal combustion engines shall, on a pounds-per-hour basis, emit no more than they emit at rated bhp and rated speed." Combined emission limitations have been included as plan approval conditions in units of g/bhp-hr at rated bhp and speed, and in units of lb/hr at all other operating conditions excluding periods of startup, shutdown, and malfunction. This reflects a mass-based emission limitation on the engines and is consistent with recent plan approvals and operating permits issued by the Department for similar sources.

NSPS from 40 CFR Part 60 Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution have been finalized on August 16, 2012, and became effective on October 15, 2012. Smith will be subject to 40 CFR Part 60

Subpart OOOO as a reciprocating compressor and storage vessel affected facility. Pneumatic controllers to be installed at Smith will not be gas-driven and will not be affected facilities under this subpart. Applicable requirements for reciprocating compressors include rod packing replacement and associated notifications, recordkeeping, and reporting. These requirements will be included as plan approval conditions. Applicable requirements for storage vessels will not be included under this authorization because the storage vessels are currently authorized under GP5-63-00968. These requirements will be subsequently included in an operating permit that incorporates all the sources at Smith. MarkWest is required to comply with all applicable requirements of 40 CFR Part 60 Subpart OOOO in any case.

National Emission Standards for Hazardous Air Pollutants (NESHAPS) from 40 CFR Part 63 Subpart HH - Oil and Natural Gas Production Facilities applies to this facility. Per 40 CFR 63.760(a), “This subpart applies to the owners and operators of the emission points, specified in paragraph (b) of this section that are located at oil and natural gas production facilities that meet the specified criteria in paragraphs (a)(1) and either (a)(2) or (a)(3) of this section.” Smith will include one new tri-ethylene glycol dehydration unit as specified in paragraph (b) and also meets the criteria of paragraph (a)(1) as an area source of HAP and (a)(3) as a facility that upgrades natural gas prior to the point at which natural gas enters the transmission and storage source category.

Per 40 CFR 63.764(e)(1)(ii), “the owner or operator is exempt from the requirements of [40 CFR 63.764(c)(1) and (d) if the actual average emissions of benzene from the glycol dehydration unit process vent to the atmosphere are less than 0.90 megagram [1 ton] per year, as determined by the procedures specified in 40 CFR 63.772(b)(2).” Potential benzene emissions from the dehydrator are estimated at 0.10 tons per year. MarkWest must maintain records of the glycol dehydration unit exemption in accordance with 40 CFR 63.774(d)(1). These records include the option of either determining actual average benzene emissions using GRI-GLYCalc or through direct measurement.

40 CFR Part 63 Subpart HH was amended on August 16, 2012, effective October 15, 2012, to include new requirements for “small” glycol dehydration units located at a major source. These units are defined to have actual annual average natural gas flow rates less than 85,000 standard cubic meters per day or actual average benzene emissions less than 1 ton per year. However, Smith is and will remain an area source of HAP emissions and the new requirements for “small” glycol dehydration units will not be applicable to this facility.

NESHAP for Stationary Reciprocating Internal Combustion Engines (RICE) from 40 CFR Part 63 Subpart ZZZZ have been amended on January 18, 2008, and August 20, 2010. Per 40 CFR 63.6585 a person is subject to this subpart if they own or operate a stationary RICE at a major or area source of HAP emissions, except if the stationary RICE is being tested at a stationary RICE test cell/stand. This facility is and will remain an area source of HAP emissions, particularly formaldehyde, and includes stationary RICE sources that are not being tested at a stationary RICE test cell/stand. The proposed compressor engines therefore will be subject to 40 CFR Part 63 Subpart ZZZZ.

According to 40 CFR 63.6590(a)(2)(iii), each P9390GSI engine will be classified as a new stationary RICE. However, Subpart ZZZZ continues per 40 CFR 63.6590(c) to subject an

affected source to the requirements of 40 CFR Part 60 Subpart JJJJ and remove all further requirements under NESHAPS Subpart ZZZZ if the affected source meets any of the criteria of (c)(1) through (7) of this section. All proposed engines meet criteria (1) as new stationary RICE located at an area source, and are not subject to further requirements under 40 CFR Part 63 Subpart ZZZZ.

40 CFR Part 98 Subparts A, C, W have been promulgated on October 30, 2009, and November 30, 2010. The Department has been advised by EPA that greenhouse gas (“GHG”) emission information cannot be requested under authority of 40 Part 98 at this time. GHG emissions reporting under the Mandatory Reporting Rule is not currently considered an “applicable requirement” under EPA regulations implementing Title V and therefore does not have to be included in a plan approval for minor or major sources. 40 CFR Part 98 and associated subparts may be applicable but this is to be determined by EPA. Applicable greenhouse gas reporting conditions may be included in an operating permit at a later date. An applicant is subject to any and all applicable requirements regardless of if they are included as conditions within a plan approval. The Department has elected to require the reporting of GHG emissions for all sources under 25 Pa. Code 127.12b for purposes of evaluating future applicability of the greenhouse gas tailoring rule.

BAT

Waukesha P9390GSI Engines:

Emission rate limits for NO_x, CO, and VOC have been established as indicative of the application of BAT to rich burn natural gas-fired internal combustion engines. The proposed emission rates are found to be universally lower than the newest applicable emission limits under NSPS Subpart JJJJ, the Department’s current GP-5, and the Department’s proposed revision to GP-5 for NO_x, CO, VOC, and formaldehyde. No formaldehyde emission limitation exists under applicable federal regulations or the Department’s current GP-5.

BAT for control of NO_x, CO, VOC, and formaldehyde from rich burn engines has been determined to be firing pipeline quality natural gas, good combustion practices, proper operation and maintenance, post combustion control by three-way catalysts, and use of an air/fuel ratio controller. Rich burn engines operate with little to no excess air and high NO_x and CO emissions before post combustion control. Installation of post combustion control on rich burn engines is both technically and economically feasible, and enables the rich burn engine to maintain lower NO_x emissions than uncontrolled ultra lean burn engines are capable of.

A NO_x emission limit of 0.20 g/bhp-hr has been accepted to represent the application of BAT to this set of engines. A NO_x emission limit of 0.20 g/bhp-hr has recently been incorporated into PA-11-00356C for Laurel Ridge / Rager Mountain Compressor Station and PA-63-00969A for Three Brothers Compressor Station for similar or identical engines. The engine manufacturer Waukesha states that while rich burn engines with a 3-way catalyst are capable of meeting a 0.15 g/bhp-hr NO_x emission rate with the proper catalyst selection, this would likely not be achievable 100% of the time in practice. Maintaining continuous compliance with a 0.15 g/bhp-hr emission limit is more difficult due to a smaller air to fuel ratio operating range and increased sensitivity to temperature, humidity, and fuel variations. A 0.20 g/bhp-hr emission limit accounts for the

impact of variability of site conditions and has been proposed by the applicant. Emissions data provided by the three-way catalyst manufacturer Johnson Matthey indicates a NO_x output emission rate of 0.15 g/bhp-hr. Although allowances have been made for the effect of site variability on the emission rates, MarkWest is still expected to meet good operating practices and follow manufacturer's specifications and maintenance schedules. An automatic air/fuel ratio controller is to be installed and operated on each engine as required for the proper operation of the three-way catalyst.

The Department is aware of lean burn natural gas-fired engines controlled by selective catalytic reduction (SCR) operating in compliance with a 0.15 g/bhp-hr NO_x emission limit in Loudon County, VA. This emission limit however has been established through a LAER determination in an area classified as severe nonattainment for the 1-hour ozone standard and moderate nonattainment for the 8-hour ozone standard.

Tri Ethylene Glycol Dehydrator

BAT for control of VOC and HAP emissions from the dehydrator (with uncontrolled potential VOC emissions in excess of 10 tons per year) is proper operation and maintenance and control with a flash tank and flare. Capture efficiency is expected to be nearly 100% and control efficiency is designed for 98%. This effective control efficiency exceeds the 85% control efficiency that would be required under GP-5 Condition 13.c.i.

Table 2: BAT Summary

Source	Pollutant BAT			
	NO _x	CO	VOC	Formaldehyde
Rich Burn Natural Gas-Fired Engines	Good combustion practices including air/fuel ratio control to operate at the proper rich burn ratio. Installation and proper maintenance and use of three-way catalysts, and air/fuel ratio controllers.			
	VOC		HAP	
Glycol Dehydrator	Proper operation and maintenance and control by flash tank and flare.			

New Source Review (NSR) Applicability and Emissions Aggregation

Per 40 CFR 81.339, Smith Township, Washington County is classified as an area of attainment for all National Ambient Air Quality Standards (NAAQS) except for annual and 24-hour PM_{2.5}, and 8-hour ozone. All of the Commonwealth of Pennsylvania is located in the Northeast Ozone Transport Region which is equivalent to a moderate ozone nonattainment area. Recognized precursor pollutants for PM_{2.5} are SO₂ and NO_x, and for ozone are NO_x and VOC. For purposes of Non-Attainment (NA)NSR, a facility is major if the potential to emit exceeds 100 tons of PM_{2.5}, 100 tons of NO_x, 50 tons of VOC, or 100 tons of SO₂ per year. The major source threshold for Prevention of Significant Deterioration (PSD), for this type of facility, is potential emissions of 250 TPY of a single attainment pollutant. NO_x and SO₂ are unique in that they are potentially subject to both PSD and NANSR by virtue of their standing as attainment criteria pollutants (NO₂, SO₂) and as non-attainment ozone and PM_{2.5} precursors respectively. The Title V major source criteria for Hazardous Air Pollutants (HAPs) is an emission potential of 10 TPY

of a single HAP or 25 TPY of the sum of all emitted HAPs. Facilities with PTEs that do not exceed major source thresholds for HAPs are known as area sources.

This facility does not have the potential to emit criteria and hazardous air emissions in excess of the thresholds for Title V, NANSR, and PSD and is not considered a Major Source by these programs. Therefore, it is not subject to requirements of these programs.

The aggregation of emissions from Smith Compressor Station with other air contamination sources has been examined for permitting purposes.¹ Each of the following three criteria must be met for emission sources to be aggregated and be considered a single facility under PSD regulations:

1. Are the sources under common control?
2. Do the sources belong to the same industrial grouping?
3. Are the sources located on contiguous or adjacent properties?

Similarly, per the definition of facility in 25 Pa. Code §127.1, each of the following two criteria must be met for emission sources to be aggregated and be considered a single facility under NANSR regulations:

1. Are the sources owned or operated by the same person under common control?
2. Are the sources located on one or more contiguous or adjacent properties?

Contiguous or Adjacent

Per the Department's *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, "well production pads and compressor stations are dispersed across a wide area that could encompass many square miles so that the leased properties can be accessed and natural gas can be extracted, compressed, and conveyed via pipeline to a nearby processing facility. Such expansive operations would not comport with the 'common sense notion of a plant'."²

Smith and Natural Gas Production Wells

¹ HAP emissions are not relevant to this aggregation discussion. Section 112(n)(4) of the Clean Air Act Amendments of 1990 states "Emissions from any pipeline compressor or pump station shall not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources, and in the case of any oil or gas exploration or production well (with its associated equipment), such emissions shall not be aggregated for any purpose under this section." This statement applies to HAP emissions, which are the emissions regulated under Section 112. This statement is incorporated into the Code of Federal Regulations (CFR) by restricting aggregation of sources in the definitions of Major Source pertaining to 40 CFR 63, Subpart HH and 40 CFR 63, Subpart HHH. It is also incorporated in the Department's definition of a Title V Facility under 25 Pa. Code §121.1(i)(A). It does not apply to other regulations, *i.e.* regulation of criteria emissions.

² See Department of Environmental Protection Bureau of Air Quality, Document Number 270-0810-006, Title: *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, Effective Date: October 12, 2011, pg. 5

No active natural gas production wells (or other stationary sources) have been located within ¼ mile of the proposed Smith location using the eMapPA application. The eMapPA application overlays site location and other data for permitted operations onto a PA County and Township map. Permit locations are identified by latitude and longitude provided with each application. Additionally, the operational status of each oil and gas location is noted by eMapPA. Production pads and compressor stations are dispersed across a wide area that encompasses many square miles in this region. These expansive operations do not generally comport with the “common sense notion of a plant.” Aggregation of permitted natural gas production wells within 1 mile (or more) of Smith would not be expected to affect the regulatory status of the facility in any case. As all applicable criteria need to be met in order for emission sources to be aggregated, the remaining criteria do not need to be examined at this time for Smith and natural gas production wells.

Smith and Houston Gas Plant

Smith Compressor Station and Houston Gas Plant are not located within ¼ mile of each other. Per the Department’s *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, “properties located outside a quarter mile may be considered contiguous or adjacent on a case-by-case basis.”³ Case-by-case facts pertaining to the possible adjacency of these facilities are as follows:

- Smith and Houston Gas Plant will be connected to each other by a series of pipelines dedicated to the transport of natural gas;
- All of the natural gas handled at Smith will need not be directed to Houston Gas Plant;
- Produced gas may be sent downstream from Smith to Houston Gas Plant, but may not be sent upstream from Houston Gas Plant to Smith;
- Gas may be sent to a separately owned and operated gathering line, where it can be transported to the Majorsville Gas Plant or another processing facility;
- Houston Gas Plant can and does also accept hydrocarbons for processing from other sources, and;
- The distance between Smith and Houston Gas Plant is approximately 12 miles as has been confirmed by MarkWest.

Contiguous and adjacent are not explicitly defined regulatory terms. The Department has taken the plain meaning of these words and considers that they “mean and relate to a spatial relationship or spatial distance or proximity.”⁴ Other factors including but not limited to interdependence may impact a case-by-case analysis of contiguous or adjacent, but proximity is the primary factor. In consideration of the above-mentioned factors, the Department believes that these pollutant emitting activities do not fit within the ordinary meaning of “building,” “structure,” “facility,” or “installation.” The Department concludes that Smith and Houston Gas

³ See Department of Environmental Protection Bureau of Air Quality, Document Number 270-0810-006, Title: *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, Effective Date: October 12, 2011, pg. 6

⁴ See Department of Environmental Protection Bureau of Air Quality, Document Number 270-0810-006, Title: *Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries*, Effective Date: October 12, 2011, pg. 5

Plant do not meet the “contiguous or adjacent” criterion necessary for aggregation with one another. This is consistent with earlier decisions under previous general permits and plan approvals regarding both Houston Gas Plant and other natural gas compressor stations. As all criteria need to be met in order for emissions from sources to be aggregated, the remaining criteria do not need to be examined at this time for Smith and Houston Gas Plant.

EMISSIONS & CONTROLS

Emission calculations were carried out by the applicant for the newly proposed Waukesha P9390GSI natural gas-fired compressor engines based upon the engine manufacturer’s and catalyst manufacturer’s emissions data sheets, AP-42 emission factors from Table 3.2-3, and 8,760 hours of annual operation under full load. The P9390GSI engines are rich burn natural gas-fired engines to be equipped with Johnson Matthey non-selective catalytic reduction (“NSCR”) for control of NO_x, CO, VOC, and formaldehyde. Johnson Matthey provided an engine specific “Scope of Supply” report detailing pre- and post-control emission rates for NO_x, CO, VOC and formaldehyde. Emissions are expected to be reduced by 98.8% for NO_x, 97.2% for CO, 60% for VOC, and 80% for formaldehyde. Catalyst operation will be controlled by Altronic EPC-100 (or equivalent) air/fuel ratio controllers. The applicant has also included an estimate of other HAP emissions using AP-42 Table 3.2-3 emission factors and 60% control efficiency from the NSCR. All emission rates were found to be acceptable and below the regulatory limit. Combined annual emissions are included for the eight new compressor engines.

Table 3: Waukesha P9390GSI Compressor Engines PTE

Air Contaminant	Emission Rate (g/bhp-hr)	Emission Rate (lb/hr)	Yearly Emission Rate Per Engine ^b (tpy)	Yearly Emission Rate Total ^{a, b} (tpy)
NO _x	0.20	0.87	3.82	30.56
CO	0.26	1.14	4.97	39.76
PM/PM ₁₀	0.027	0.12	0.51	4.08
VOC	0.12	0.53	2.30	18.4
Formaldehyde	0.010	0.044	0.20	1.6
HAP (Total)	-	0.118	0.522	4.176

^a A total of eight P9390GSI engines.

^b Values may be slightly inconsistent out to the second decimal due to rounding.

Emission calculations were carried out by the applicant for the tri ethylene glycol dehydrator using GRI-GLYCalc Version 4.0, a daily natural gas throughput of 130 MMscf/day, operation for a worst case 8,760 hours per year, and control by a flare. The dehydrator will be equipped with a SFI (or equivalent) enclosed flare for the control of VOC and HAP emissions. A destruction efficiency of 98% is conservatively estimated. A minimum control efficiency of 85% is required under current GP-5 Condition 13.c.i. for dehydrators with uncontrolled potential VOC emission greater than 10 tons per year. The dehydrator is also equipped with a flash tank but only emissions less than de minimis are expected from it due to control with a Hy-Bon (or equivalent) vapor recovery unit (VRU). Reboiler and flare emissions were estimated by the

applicant using AP-42 Tables 1.4-1 and 13.5-1 respectively, with a worst case operation time of 8,760 hours per year.

Produced natural gas expected at the inlet to Smith is identified as “wet” or “heavy” meaning the amount of heavier (propane and larger) hydrocarbons is significant enough that the gas requires additional processing before meeting transmission line specifications. This also includes HAPs such as benzene, xylene, toluene, and ethylbenzene. Constituents of the gas excluding VOC and HAPs (methane, ethane, nitrogen, and carbon dioxide) are expected to make up 75.5% of the gas by weight leaving 24.5% of the gas as VOC, with approximately 1.35% of the gas as HAPs. VOC and HAP emissions from the dehydrator and tanks will require control as a result. Natural gas dehydrated by Smith will require additional processing to remove these hydrocarbon liquids before the gas meets normal transmission pipeline gas specifications.

Table 4: Dehydrator (including reboiler and flare) PTE

Air Contaminant	Emission Rate (tpy)
NO _x	2.47
CO	9.63
VOC	6.72
Benzene	0.104
HAPs (Total)	0.943

Emission calculations were carried out by the applicant for each Waukesha L7042GSI compressor engine and each John Deere 6068HF285 generator engine at this facility in its most recent GP-5 and GP-9 applications. See the GP5-63-00969 and GP9-63-00969 applications or review memos for a more detailed summary of these emissions. The PTE for these sources is totaled in the table below and also included in the facility PTE.

Table 5: Previously Authorized Engines (GP5-63-00969, GP9-63-00969) PTE in Tons Per Year

Air Contamination Source	NO _x	CO	PM/PM ₁₀	VOC	Formaldehyde	HAP
L7042GSI #1	2.86	3.57	0.39	2.46	0.14	0.38
L7042GSI #2	2.86	3.57	0.39	2.46	0.14	0.38
John Deere #1	5.65	0.19	0.31	1.27	0.01	0.01
John Deere #2	5.65	0.19	0.31	1.27	0.01	0.01
Total	17.02	7.52	1.40	7.46	0.30	0.78

Emission calculations were carried out by the applicant for storage tanks using a HYSYS model run and the natural gas analysis for this facility along with a calculated liquid throughput of 92 thousand gallons per year. Each storage tank will be controlled by the VRU which recovers and recompresses vapors back into the separator. The applicant expects 100% capture and control of vapors but estimates control efficiency at 98% to be conservative.

Table 6: Storage Tanks PTE

Air Contaminant	Emission Rate (tpy)
VOC	0.90
HAPs (Total)	0.20

Emission calculations were carried out by the application for fugitive emissions component leaks and blowdowns at its facility. Component leak emissions were calculated using API 4615 factors, an estimated facility component count, measured VOC and HAP concentrations where applicable, and a worst case operation of 8,760 hours per year. Blowdown emissions were calculated using estimates of 3 blowdowns per engine per month and 4 facility-wide emergency shutdowns per year, and measured VOC and HAP concentrations were applicable.

Table 7: Facility Fugitive PTE

Air Contamination Source	VOC Emission Rate (tpy)	HAP Emission Rate (tpy)
Blowdowns	5.18	0.29
Component Leaks	4.94	0.35
Total Fugitive	10.12	0.64

Table 8: Facility-Wide Potential to Emit

Air Contaminant	Emission Rate ^b (tpy)
NO _x	50.1
CO	56.9
PM/PM ₁₀	5.5
VOC	43.6
Formaldehyde	1.9
HAP ^a	6.74

^a Total HAP includes approximately 0.78 tons of Methanol, 0.72 tons of Acetaldehyde, 0.67 tons of Acrolein, and 0.41 tons of Benzene from internal combustion engines. Formaldehyde is the primary HAP of concern at this facility and is listed separately as well as included in the total.

^b Values may be slightly inconsistent due to rounding

The Clean Air Act required EPA to set National Ambient Air Quality Standards (“NAAQS”) for pollutants considered harmful to public health and the environment and establishes two levels of national air quality standards. Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Smith is currently and will remain classified as a minor facility and as such is not typically required to perform modeling to demonstrate that the emissions from this facility will not cause or contribute to a violation of any NAAQS. As a minor facility, emissions are not expected to exceed the NAAQS or significant impact levels for the NAAQS.

Formaldehyde is a known carcinogen and the primary HAP expected to be emitted from air contamination sources at Smith. N-hexane, benzene, toluene, and xylene combined are expected to constitute up to 1.35% of the inlet gas to the facility per the natural gas analysis provided with this application. The Department has recently received air quality screening data on behalf of Pennsylvania Waste Industries Association for a model landfill scenario in which multiple landfill gas-fired engines emit formaldehyde. The PTE for formaldehyde in this scenario is approximately 12.17 tons per year (compared to the worst case 1.9 tons per year potentially emitted from Smith). The nearest resident in this scenario was modeled at 374 feet from the point source of emissions. Cumulative cancer and non-cancer risks from the model scenario were found to be below the Department's human health risks benchmarks. Smith' formaldehyde PTE is 15.6% of the model landfill scenario. The comparison is not absolute due to possible differences in local terrain and meteorological data but the modeling produces conservative results and the differences would not be expected to offset the lower PTE at Smith.

The Department has also received air dispersion modeling and risk assessment for formaldehyde and other hazardous air pollutants potentially emitted by SCI Laurel Highlands' cogeneration facility. Formaldehyde emissions from two landfill gas-fired engines at this facility were modeled considering their maximum potential emission rate of 6.86 tons per year (compared to the worst case 1.9 tons per year potentially emitted from Smith). Model receptors in this case were placed at 50-meter intervals out to 2,000 meters from the sources. Formaldehyde concentrations from the landfill gas-fired engines were shown to be less than the acute (1-hour average) and chronic (5-year average) toxicity benchmarks provided by the Department. Total HAP risk levels from the two landfill gas-fired engines were also shown to be less than the long-term hazard quotient and calculated cancer risk thresholds.

Greenhouse Gas Emissions

U.S. EPA determined on December 07, 2009 that GHGs are a threat to public health and welfare. Following this determination, the Department has performed an examination of GHG emissions for this project from all sources as part of this plan approval review process.

U.S. EPA issued a final Title V Greenhouse Gas Tailoring Rule on May 13, 2010. This rule establishes an applicability timeline and GHG emission thresholds for requiring facilities to be permitted for GHG emissions. Implementation of the GHG Tailoring Rule is to occur in phases with the first phase commencing on January 2, 2011. In this phase, PSD and Title V requirements only apply to facilities that would already be subject to PSD or Title V for non-GHG pollutants and also have a carbon dioxide equivalent (CO₂e) PTE of at least 75,000 tpy. This facility is not subject to PSD and will not be subject to Title V permitting for non-GHG pollutants. The second phase commences on July 1, 2011 and applies permitting requirements to new facilities regardless of their non-GHG emissions. PSD requirements will apply to proposed new facilities with a CO₂e PTE of at least 100,000 tpy or existing facilities with a CO₂e PTE of 100,000 tpy that also undertake a modification that increases their PTE of CO₂e by at least 75,000 tpy. Title V permitting requirements will apply to facilities with a potential to emit of at least 100,000 tpy CO₂e. Emission description requirements for GHGs in Title V regulations will generally be satisfied by referencing information provided under the GHG mandatory reporting rule.

Table 9 below shows the calculated GHG PTE from this facility. GHG emissions are those emissions of carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, and other fluorinated greenhouse gases defined in 40 CFR Part 98 Subpart A. Each different GHG emission is considered to impact global warming at varying levels. CO₂e emissions are the combined impact of each GHG emission after it is normalized to the impact of CO₂ as a reference. Total CO₂e emissions are shown to be less than the 100,000 tpy Title V Greenhouse Gas Tailoring Rule threshold.

Table 9: Facility Greenhouse Gas Potential to Emit

Source	CO ₂ e Emission Rate (tpy)
Dehydrator	2,553
Reboiler and Flare Pilot	1,147
Waukesha P9390GSI Engine x 8	72,432
Waukesha L7042GSI Engine x 2	13,338
John Deere 6068HF285 Engine x 2	1,780
Facility Fugitive Emissions ^a	357
Facility Total	91,607

^a Includes storage tanks, facility component leaks, and blowdown estimates.

RECOMMENDATIONS

MarkWest Liberty Midstream and Resources, LLC has shown that emissions will be minimized through the use of appropriate BAT in this application for installation of eight new natural gas-fired compressor engines and an increase of dehydrator throughput at its Smith Compressor Station. I recommend issuance of a Plan Approval for a period of 18 months subject to the standard conditions in Section B of all plan approvals along with the special conditions below.

SPECIAL CONDITIONS

1. This Plan Approval is to allow the construction and temporary operation of eight new natural gas compressor engines and increased throughput of one tri ethylene glycol dehydrator by MarkWest Liberty Midstream and Resources, LLC at its Smith Compressor Station located in Smith Township, Washington County [25 Pa. Code §127.12b].
2. New air contamination sources and air cleaning devices authorized to be installed at the Facility under this Plan Approval are as follows [25 Pa. Code §127.12b]:
 - Eight (8) Waukesha, Model No. P9390GSI, rich-burn spark ignition natural gas-fired engines, 1,980 bhp @ 1,200 rpm; controlled by Johnson Matthey, Model No. QXH-O-90-Quad (or equivalent), NSCR units; regulated by Altronic EPC-100 (or equivalent), automatic air/fuel ratio controllers.

3. New air contamination sources and air cleaning devices authorized to continue construction with increased throughput at the Facility under this Plan Approval are as follows [25 Pa. Code §127.12b]:
 - One (1) tri ethylene glycol dehydrator, 130 MMscf/day (previously 40 MMscf/day); equipped with flash tank and flash gas recycle/recompression; regenerator controlled by a SFI 48" enclosed flare (or equivalent), rated at 2.1 MMBtu/hr.
4. Visible emissions from each engine stack and the flare shall not exceed the following limitations [25 Pa. Code §127.12b]:
 - a. Equal to or greater than 10% opacity for a period or periods aggregating more than three minutes in any one hour.
 - b. Equal to or greater than 30% opacity at any time.
5. Emissions from each P9390GSI compressor engine shall be limited to the following [25 Pa. Code §127.12b]:

At rated bhp and speed:

 - a. NO_x – 0.20 g/bhp-hr
 - b. CO – 0.26 g/bhp-hr
 - c. VOC – 0.12 g/bhp-hr

At all operating conditions excluding startup, shutdown, and malfunction:

 - a. NO_x – 0.87 lb/hr
 - b. CO – 1.14 lb/hr
 - c. VOC – 0.53 lb/hr
6. There shall be no fugitive emissions from the facility contrary to Pa. Code Title 25 §123.1 & §123.2.
7. The Owner/Operator may not permit the emission into the outdoor atmosphere of particulate matter from compressor engine stacks in excess of 0.04 gr/dscf [25 Pa. Code § 123.13].
8. The Owner/Operator may not permit the emission into the outdoor atmosphere of sulfur oxides from compressor engine and flare stacks in a manner that the concentration of the sulfur oxides, expressed as SO₂, in the effluent gas exceeds 500 parts per million, by volume, dry basis [25 Pa. Code § 123.21].
9. The Owner/Operator may not permit the emission into the outdoor atmosphere of any malodorous air contaminants from any source in such a manner that the malodors are detectable outside of the property of the Facility [25 Pa. Code §123.31].
10. A facility-wide inspection shall be conducted at a minimum of once each day that the Facility is visited by the Owner/Operator, during daylight hours, and while the sources are operating. The facility-wide inspection shall be conducted for the presence of the following [25 Pa. Code §127.12b]:

- a. Visible stack emissions;
- b. Fugitive emissions; and
- c. Potentially objectionable odors at the property line.

If visible stack emissions, fugitive emissions, or potentially objectionable odors are apparent, the Owner/Operator shall take corrective action. Records of each inspection shall be maintained in a log and at the minimum include the date, time, name and title of the observer, along with any corrective action taken as a result.

11. The Owner/Operator of each stationary source emitting criteria pollutants (including but not limited to NO_x, CO, VOC [including formaldehyde], SO_x, PM₁₀, and PM_{2.5}), HAP, greenhouse gases (GHG) in the form of CO₂ equivalent (CO₂e), and GHG on a mass-basis shall provide the Department with a statement, in a form as the Department may prescribe, for classes or categories of sources, showing the actual emissions of criteria pollutants, HAP (per the Department's Emissions Inventory Reporting Instructions), GHG in the form of CO₂e, and GHG on a mass-basis from that source for each reporting period. A description of the method used to calculate the emissions and the time period over which the calculation is based shall be included. The statement shall also contain a certification by a company officer or the plant manager that the information contained in the statement is accurate [25 Pa. Code §127.12b].
12. Annual emission reporting shall be conducted as follows [25 Pa. Code §135.3]:
 - a. The Owner/Operator shall submit by March 1 of each year, a source report for the preceding calendar year. The report shall include information for all previously reported sources, new sources which were first operated during the proceeding calendar year, and sources modified during the same period which were not previously reported.
 - b. A person who received initial notification by the Department that a source report is necessary shall submit an initial source report within 60 days after receiving the notification or by March 1 of the year following the year for which the report is required, whichever is later.
 - c. A source Owner/Operator may request an extension of time from the Department for the filing of a source report, and the Department may grant the extension for reasonable cause.
13. All air contamination sources and controls authorized under this Plan Approval shall be operated per the manufacturer's specifications and maintained according to the manufacturer's maintenance schedule. Manufacturer's specifications include, but are not limited to, the following [25 Pa. Code § 127.12b]:
 - a. Catalyst inlet temperature for the Johnson Matthey three-way catalysts installed on the Waukesha engines shall be maintained at a minimum of 850°F under all operating conditions excluding startup, shutdown, and malfunction.
 - b. Johnson Matthey three-way catalysts installed on the Waukesha engines shall be operated with automatic air/fuel ratio controllers.

14. The Owner/Operator shall perform NO_x and CO emission tests upon each Waukesha P9390GSI compressor engine at the Facility according to the requirements of 25 Pa. Code Chapter 139, 40 CFR §60.4243, and 40 CFR §60.4244. Initial emission testing is required within 180 days of startup of each compressor engine. Subsequent testing shall be performed within twelve (12) months of initial stack testing and annually thereafter. EPA Method stack testing shall be conducted for the initial stack test. Portable analyzer testing according to ASTM Method D6522-00 or other portable methods if approved by the Department and included in Table 2 to Subpart JJJJ of Part 60 are acceptable for subsequent annual testing [25 Pa. Code § 127.12b].
15. The Owner/Operator shall perform VOC emission tests upon each Waukesha P9390GSI compressor engine at the Facility according to the requirements of 40 CFR §§60.4243 and 60.4244. These requirements are included as compressor engine source group conditions. Initial emission testing is required within one hundred eighty (180) days of startup of each compressor engine. Subsequent VOC testing shall be performed every 8,760 hours or 3 years, whichever comes first. EPA Method stack testing shall be conducted for the initial stack test. Portable analyzer testing according to ASTM Methods D6522-00 and D6348-03, or other methods included in Table 2 to Subpart JJJJ of Part 60 are acceptable for subsequent testing [25 Pa. Code § 127.12b].
16. Performance testing shall be conducted as follows [25 Pa. Code §127.12b and §139.11]:
 - a. The Owner/Operator shall submit three copies of a pre-test protocol to the Department for review at least 45 days prior to the performance of any EPA reference method stack test. The Owner/Operator shall submit three copies of a one-time protocol to the Department for review for the use of a portable analyzer and may repeat portable analyzer testing without additional protocol approvals provided that the same method and equipment are used. All proposed performance test methods shall be identified in the pre-test protocol and approved by the Department prior to testing.
 - b. The Owner/Operator shall notify the Regional Air Quality Manager at least 15 days prior to any performance test so that an observer may be present at the time of the test. Notification shall also be sent to the Division of Source Testing and Monitoring. Notification shall not be made without prior receipt of a protocol acceptance letter from the Department.
 - c. Pursuant to 40 CFR Part 60.8(a), a complete test report shall be submitted to the Department no later than 60 calendar days after completion of the on-site testing portion of an emission test program.
 - d. Pursuant to 25 Pa. Code Section 139.53(b) a complete test report shall include a summary of the emission results on the first page of the report indicating if each pollutant measured is within permitted limits and a statement of compliance or non-compliance with all applicable permit conditions. The summary results will include, at a minimum, the following information:

1. A statement that the owner or operator has reviewed the report from the emissions testing body and agrees with the findings.
 2. Permit number(s) and condition(s) which are the basis for the evaluation.
 3. Summary of results with respect to each applicable permit condition.
 4. Statement of compliance or non-compliance with each applicable permit condition.
- e. Pursuant to 25 Pa. Code § 139.3 all submittals shall meet all applicable requirements specified in the most current version of the Department's Source Testing Manual.
 - f. All testing shall be performed in accordance with the provisions of Chapter 139 of the Rules and Regulations of the Department of Environmental Protection.
 - g. Pursuant to 25 Pa. Code Section 139.53(a)(1) and 139.53(a)(3) all submittals, besides notifications, shall be accomplished through PSIMS*Online available through <https://www.depgreenport.state.pa.us/ecommm/Login.jsp> when it becomes available. If internet submittal can not be accomplished, three copies of the submittal shall be sent to the Pennsylvania Department of Environmental Protection, Bureau of Air Quality, Division of Source Testing and Monitoring, 400 Market Street, 12th Floor Rachael Carson State Office Building, Harrisburg, PA 17105-8468 with deadlines verified through document postmarks.
 - h. The permittee shall ensure all federal reporting requirements contained in the applicable subpart of 40 CFR are followed, including timelines more stringent than those contained herein. In the event of an inconsistency or any conflicting requirements between state and the federal, the most stringent provision, term, condition, method or rule shall be used by default.
17. The Owner/Operator shall maintain the following comprehensive and accurate records [25 Pa. Code §127.12b]:
- a. Monthly hours of operation for each engine and each flare.
 - b. Monthly fuel consumption for each engine and each flare.
 - c. Records including a description of testing methods, results, all engine operating data collected during tests, and a copy of the calculations performed to determine compliance with emission standards for each internal combustion engine.
 - d. Copies of the report that demonstrates that the engines were operating at rated bhp and speed conditions during performance testing.
 - e. Copies of the manufacturer's recommended maintenance schedule for all air contamination sources and air cleaning devices including each engine, dehydrator, catalyst, flare, and VRU.
 - f. Records of any maintenance conducted on each engine, dehydrator, catalyst, flare, and VRU.
 - g. Records of catalyst inlet and outlet temperature readings performed at a minimum of once each month on each Waukesha P9390GSI engine operated during the month.

- h. The dehydrator VOC and benzene emissions using GRI-GLYCalc data from no less recent than the previous year if the natural gas composition has changed or an alternative method approved by the Department.
- i. Records of actual throughput per day and the glycol circulation rate for the dehydrator.
- j. Records of a fractional natural gas analysis performed once each month on the inlet natural gas to the facility.
- k. Records of the date, time, and approximate duration of each blowdown or emergency shutdown at the facility.
- l. Records of facility-wide inspections including the date, time, name, and title of the observer, along with any corrective action taken as a result.

18. All logs and required records shall be maintained on site for a minimum of five years and shall be made available to the Department upon request [25 Pa. Code §127.12b].

19. The Facility is subject to New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines (40 CFR Part 60 Subpart JJJJ) and for Crude Oil and Natural Gas Production, Transmission and Distribution (40 CFR Part 60 Subpart OOOO); and National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities (40 CFR Part 63 Subpart HH) and for Stationary Reciprocating Internal Combustion Engines (40 CFR Part 63 Subpart ZZZZ). In accordance with 40 CFR §60.4 and 40 CFR §63.9, copies of all requests, reports, applications, submittals and other communications regarding the affected facilities shall be forwarded to both EPA and the Department at the addresses listed below unless otherwise noted.

Director
 Air Protection Section
 Mail Code 3AP00
 US EPA, Region III
 1650 Arch Street
 Philadelphia, PA 19101-2029

PADEP
 Air Quality Program
 400 Waterfront Drive
 Pittsburgh, PA 15222-4745

20. The Owner/operator shall provide EPA with the notifications required by 40 CFR § 60.7. Required notifications may include but are not necessarily limited to: date of commencement of construction (within 30 days after starting construction), actual start-up date (within 15 days after equipment start-up), physical or operational changes which may increase the emission rate of any air pollutant to which a standard applies (60 days or as soon as practicable before equipment start-up), and opacity observations (within 30 days) [25 Pa. Code §127.12b].

21. Each Waukesha P9390GSI compressor engine, approved to be installed under this plan approval, is subject to the requirements under 40 CFR Part 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines [40 CFR §60.4230].

22. Compliance requirements as an Owner/Operator of a stationary SI internal combustion engine [40 CFR §60.4243].

a. N/A

b. As an Owner/Operator of stationary SI ICE subject to the emission standards specified in §60.4233(e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (b)(2) of this condition [40 CFR §60.4243].

1) N/A

2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233(d) or (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

i. N/A

ii. If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

c. N/A

d. N/A

e. N/A

f. N/A

g. It is expected that air-to-fuel ratio controllers will be used with the operation of three-way catalysts/non-selective catalytic reduction. The AFR controller must be maintained and operated appropriately in order to ensure proper operation of the engine and control device to minimize emissions at all times.

h. N/A

i. N/A

23. Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section [40 CFR §60.4244].

a. Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to this subpart.

b. You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine.

c. You must conduct three separate test runs for each performance test required in this section, as specified in §60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.

- d. To determine compliance with the NO_x mass per unit output emission limitation, convert the concentration of NO_x in the engine exhaust using Equation 1 of this section:

$$ER = (Cd * 1.912 * 10^{-3} * Q * T) / (HP-hr) \quad (\text{Eq. 1})$$

Where:

ER = Emission rate of NO_x in g/HP-hr

Cd = Measured NO_x concentration in parts per million by volume (ppmv).

1.912×10^{-3} = Conversion constant for ppm NO_x to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

- e. To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = (Cd * 1.164 * 10^{-3} * Q * T) / (HP-hr) \quad (\text{Eq. 2})$$

Where:

ER = Emission rate of CO in g/HP-hr.

Cd = Measured CO concentration in ppmv.

1.164×10^{-3} = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

- f. For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = (Cd * 1.833 * 10^{-3} * Q * T) / (HP-hr) \quad (\text{Eq. 3})$$

Where:

ER = Emission rate of VOC in g/HP-hr.

Cd= VOC concentration measured as propane in ppmv.

1.833×10^{-3} = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

- g. If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = C_{Mi}/C_{Ai} \quad (\text{Eq. 4})$$

Where:

RF_i= Response factor of compound i when measured with EPA Method 25A.

C_{Mi}= Measured concentration of compound i in ppmv as carbon.

C_{Ai}= True concentration of compound i in ppmv as carbon.

$$C_{icorr} = RF_i * C_{imeas} \quad (\text{Eq. 5})$$

Where:

C_{icorr} = Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

C_{imeas} = Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{peq} = 0.6098 * C_{icorr} (\text{Eq. 6})$$

Where:

C_{peq} = Concentration of compound i in mg of propane equivalent per DSCM.

24. Owners or operators of stationary SI ICE must meet the following notification, reporting, and recordkeeping requirements [40 CFR §60.4245]:
- a. Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.
 - i. All notifications submitted to comply with this subpart and all documentation supporting any notification.
 - ii. Maintenance conducted on the engine.
 - iii. If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.
 - iv. If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.
 - b. N/A
 - c. Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in §60.4231 must submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section.
 - i. Name and address of the owner or operator;
 - ii. The address of the affected source;
 - iii. Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
 - iv. Emission control equipment; and
 - v. Fuel used.
 - d. Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in §60.4244 within 60 days after the test has been completed.
25. All terms used in 40 CFR Part 60 Subpart JJJJ shall have the meaning given in 40 CFR §60.4248 or else in the Clean Air Act and 40 CFR Part 60 Subpart A [40 CFR §60.4248].
26. Each Waukesha P9390GSI compressor engine, approved to be installed under this plan approval, is subject to 40 CFR Part 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines [40 CFR §63.6585].
27. Each Waukesha P9390GSI compressor engine, approved to be installed under this plan approval, is a new stationary RICE located at an area source. Each of these compressor engines must meet the requirements of 40 CFR Part 63 Subpart ZZZZ by meeting the requirements of 40 CFR Part 60 Subpart JJJJ. No further requirements apply for these engines under 40 CFR Part 63 Subpart ZZZZ [40 CFR §63.6590].
28. Each reciprocating compressor driven by a Waukesha P9390GSI compressor engine, approved to be installed under this plan approval, is subject to 40 CFR Part 60, Subpart

OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution [40 CFR §60.5365].

- 29. The Owner/Operator shall comply with the standards in paragraphs a. through d. of this section for each reciprocating compressor affected facility [40 CFR §60.5385].**
- a. You must replace the reciprocating compressor rod packing according to either paragraph a.1) or 2) of this section.**
 - 1) Before the compressor has operated for 26,000 hours. The number of hours of operation must be continuously monitored beginning upon initial startup of your reciprocating compressor affected facility, or October 15, 2012, or the date of the most recent reciprocating compressor rod packing replacement, whichever is later.**
 - 2) Prior to 36 months from the date of the most recent rod packing replacement, or 36 months from the date of startup for a new reciprocating compressor for which the rod packing has not yet been replaced.**
 - b. You must demonstrate initial compliance with standards that apply to reciprocating compressor affected facilities as required by § 60.5410.**
 - c. You must demonstrate continuous compliance with standards that apply to reciprocating compressor affected facilities as required by § 60.5415.**
 - d. You must perform the required notification, recordkeeping, and reporting as required by § 60.5420.**
- 30. The Owner/Operator shall demonstrate initial compliance with the standards for each reciprocating compressor affected facility by complying with paragraphs a. through d. of this section. The initial compliance period begins upon initial startup and ends no later than one year after the initial startup date for the reciprocating compressor affected facilities [40 CFR §60.5410].**
- a. During the initial compliance period, you must continuously monitor the number of hours of operation or track the number of months since the last rod packing replacement.**
 - b. You must submit the notifications required in 60.7(a)(1), (3), and (4).**
 - c. You must submit the initial annual report for your reciprocating compressor as required in § 60.5420(b).**
 - d. You must maintain the records as specified in § 60.5420(c)(3) for each reciprocating compressor affected facility.**
- 31. The Owner/Operator shall demonstrate continuous compliance with the standards for each reciprocating compressor affected facility by complying with paragraphs a. through c. of this section [40 CFR §60.5415].**
- a. You must continuously monitor the number of hours of operation for each reciprocating compressor affected facility or track the number of months since initial startup, or October 15, 2012, or the date of the most recent reciprocating compressor rod packing replacement, whichever is later.**

- b. You must submit the annual report as required in § 60.5420(b) and maintain records as required in § 60.5420(c)(3).
- c. You must replace the reciprocating compressor rod packing before the total number of hours of operation reaches 26,000 hours or the number of months since the most recent rod packing replacement reaches 36 months.

32. The Owner/Operator shall meet the following notification, reporting, and recordkeeping requirements for each reciprocating compressor affected facility [40 CFR §60.5420]:

- a. You must submit the notifications required in § 60.7(a)(1) and (4), and according to paragraphs a.1) and 2) of this section, if you own or operate one or more of the affected facilities specified in § 60.5365 that was constructed, modified, or reconstructed during the reporting period.
 - 1) If you own or operate a gas well, pneumatic controller or storage vessel affected facility you are not required to submit the notifications required in § 60.7(a)(1), (3), and (4).
 - 2) N/A
- b. *Reporting requirements.* You must submit annual reports containing the information specified in paragraphs b.1) through 6) of this section to the Administrator and performance test reports as specified in paragraph b.7) of this section. The initial annual report is due 30 days after the end of the initial compliance period as determined according to § 60.5410. Subsequent annual reports are due on the same date each year as the initial annual report. If you own or operate more than one affected facility, you may submit one report for multiple affected facilities provided the report contains all of the information required as specified in paragraphs b.1) through 6) of this section. Annual reports may coincide with title V reports as long as all the required elements of the annual report are included. You may arrange with the Administrator a common schedule on which reports required by this part may be submitted as long as the schedule does not extend the reporting period.
 - 1) The general information specified in paragraphs b.1)i. through iv. of this section.
 - i. The company name and address of the affected facility.
 - ii. An identification of each affected facility being included in the annual report.
 - iii. Beginning and ending dates of the reporting period.
 - iv. A certification by a responsible official of truth, accuracy, and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.
 - 2) N/A
 - 3) N/A
 - 4) For each reciprocating compressor affected facility, the information specified in paragraphs b.4)i. through ii. of this section.
 - i. The cumulative number of hours or operation or the number of months since initial startup, October 15, 2012, or since the previous reciprocating compressor rod packing replacement, whichever is later.

- ii. Records of deviations specified in paragraph c.3)iii. of this section that occurred during the reporting period.
- 5) N/A
- 6) N/A (this authorization)
- 7) N/A (this authorization)
- c. **Recordkeeping requirements.** You must maintain the records identified as specified in § 60.7(f) and in paragraphs c.1) through 10) of this section. All records must be maintained for at least 5 years.
 - 1) N/A
 - 2) N/A
 - 3) For each reciprocating compressors affected facility, you must maintain the records in paragraphs c.3)i. through iii. of this section.
 - i. Records of the cumulative number of hours of operation or number of months since initial startup or October 15, 2012, or the previous replacement of the reciprocating compressor rod packing, whichever is later.
 - ii. Records of the date and time of each reciprocating compressor rod packing replacement.
 - iii. Records of deviations in cases where the reciprocating compressor was not operated in compliance with the requirements specified in § 60.5385.
 - 4) N/A
 - 5) N/A (this authorization)
 - 6) N/A (this authorization)
 - 7) N/A (this authorization)
 - 8) N/A
 - 9) N/A
 - 10) N/A

33. **General provisions.** Table 3 to 40 CFR Part 60 Subpart OOOO shows which parts of the General Provisions in §§ 60.1 through 60.19 apply to you [40 CFR §60.5425].

34. All terms used in 40 CFR Part 60 Subpart OOOO shall have the meaning given in 40 CFR §60.5430 or else in the Clean Air Act and 40 CFR Part 60 Subparts A or VVa [40 CFR §60.5430].

35. The Owner/Operator shall comply with all additional applicable requirements of 40 CFR Part 60 Subpart OOOO, effective October 15, 2012 [25 Pa. Code §127.12b].

36. The tri ethylene glycol dehydrator, approved to be installed under this plan approval, is subject to 40 CFR Part 63 Subpart HH – National Emission Standards for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities [40 CFR §63.760].

37. All terms used in 40 CFR Part 63 Subpart HH shall have the meaning given in 40 CFR §63.761 or else in the Clean Air Act and 40 CFR Part 63 Subpart A [40 CFR §63.761].

38. Test methods, compliance procedures, and compliance demonstrations [40 CFR §63.772].

a. N/A

b. *Determination of glycol dehydration unit flowrate or benzene emissions.* The procedures of this paragraph shall be used by an owner or operator to determine glycol dehydration unit natural gas flowrate or benzene emissions to meet the criteria for an exemption from control requirements under §63.764(e)(1).

1) The determination of actual flowrate of natural gas to a glycol dehydration unit shall be made using the procedures of either paragraph (b)(1)(i) or (b)(1)(ii) of this section.

i. The owner or operator shall install and operate a monitoring instrument that directly measures natural gas flowrate to the glycol dehydration unit with an accuracy of plus or minus 2 percent or better. The owner or operator shall convert annual natural gas flowrate to a daily average by dividing the annual flowrate by the number of days per year the glycol dehydration unit processed natural gas.

ii. The owner or operator shall document, to the Administrator's satisfaction, that the actual annual average natural gas flowrate to the glycol dehydration unit is less than 85 thousand standard cubic meters per day.

2) The determination of actual average benzene emissions from a glycol dehydration unit shall be made using the procedures of either paragraph (b)(2)(i) or (b)(2)(ii) of this section. Emissions shall be determined either uncontrolled, or with federally enforceable controls in place.

i. The owner or operator shall determine actual average benzene emissions using the model GRI-GLYCalc™, Version 3.0 or higher, and the procedures presented in the associated GRI-GLYCalc™ Technical Reference Manual. Inputs to the model shall be representative of actual operating conditions of the glycol dehydration unit and may be determined using the procedures documented in the Gas Research Institute (GRI) report entitled "Atmospheric Rich/Lean Method for Determining Glycol Dehydrator Emissions" (GRI-95/0368.1); or

ii. The owner or operator shall determine an average mass rate of benzene emissions in kilograms per hour through direct measurement using the methods in §63.772(a)(1)(i) or (ii), or an alternative method according to §63.7(f). Annual emissions in kilograms per year shall be determined by multiplying the mass rate by the number of hours the unit is operated per year. This result shall be converted to megagrams per year.

c. N/A

d. N/A

- e. N/A
- f. N/A
- g. N/A

39. Recordkeeping requirements [40 CFR §63.774].

- a. N/A
- b. N/A
- c. N/A

d.

1) An owner or operator of a glycol dehydration unit that meets the exemption criteria in §63.764(e)(1)(i) or §63.764(e)(1)(ii) shall maintain the records specified in paragraph (d)(1)(i) or paragraph (d)(1)(ii) of this section, as appropriate, for that glycol dehydration unit.

- i. The actual annual average natural gas throughput (in terms of natural gas flowrate to the glycol dehydration unit per day) as determined in accordance with §63.772(b)(1), or
- ii. The actual average benzene emissions (in terms of benzene emissions per year) as determined in accordance with §63.772(b)(2).

2) N/A

- e. N/A
- f. N/A

40. Malfunction reporting shall be conducted as follows [25 Pa. Code §127.12b]:

- a. The Owner/Operator shall report each malfunction that occurs at this Facility that poses an imminent and substantial danger to the public health and safety or the environment or which it should reasonably believe may result in citizen complaints to the Department. For purposes of this condition, a malfunction is defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment or source to operate in a normal or usual manner that may result in an increase in the emission of air contaminants. Examples of malfunctions that may result in citizen complaints include but are not limited to: large dust plumes, heavy smoke, a spill or release that results in a malodor that is detectable outside the property of the person on whose land the source is being operated.
- b. When the malfunction poses an imminent and substantial danger to the public health and safety or the environment, the notification shall be submitted to the Department no later than one hour after the incident. All other malfunctions that must be reported under subsection (a) shall be reported to the Department no later than the next business day.
- c. The notice shall describe the following:

- Name and location of the facility;
 - Nature and cause of the malfunction;
 - Time when the malfunction or breakdown was first observed;
 - Expected duration of excess emissions; and
 - Estimated rate of emissions.
- d. The owner or operator shall notify the Department immediately when corrective measures have been accomplished.
- e. Subsequent to the malfunction, the owner/operator shall submit a full written report to the Department including the items identified in (c) and corrective measures taken on the malfunction within 15 days, if requested.
- f. The owner/operator shall submit reports on the operation and maintenance of the source to the Regional Air Program Manager at such intervals and in such form and detail as may be required by the Department. Information required in the reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and maintenance schedules.
- g. Malfunctions shall be reported to the Department at the following address:

PA DEP
Office of Air Quality
400 Waterfront Drive
Pittsburgh, PA 15222-4745
(412) 442-4000

41. Upon determination by the Owner/Operator that the source(s) covered by this Plan Approval are in compliance with all conditions of the Plan Approval the Owner/Operator shall contact the Department's reviewing engineer and schedule the Initial Operating Permit Inspection [25 Pa. Code §127.12b].
42. Upon completion of the Initial Operating Permit Inspection and determination by the Department that the source(s) covered by this Plan Approval are in compliance with all conditions of the Plan Approval, and at least 60 days prior to the expiration date of the Plan Approval, the Owner/Operator shall submit a State Only Operating Permit ("SOOP") application [25 Pa. Code §127.12b].
43. If, at any time, the Department has cause to believe that air contaminant emissions from the sources listed in this Plan Approval may be in excess of the limitations specified in, or established pursuant to this plan approval or the permittee's operating permit, the permittee may be required to conduct test methods and procedures deemed necessary by the Department to determine the actual emissions rate. Such testing shall be conducted in accordance with 25 Pa. Code Chapter 139, where applicable, and in accordance with any restrictions or limitations established by the Department at such time as it notifies the company that testing is required [25 Pa. Code §127.12b].

44. The Owner/Operator shall submit requests to extend the temporary operation period at least 15 days prior to the expiration date of any authorized period of temporary operation until the source(s), and modifications to existing source(s), covered by this authorization are incorporated into an issued SOOP for this facility [25 Pa. Code §127.12b].