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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2995
Plant ID No.:	069-00133
Applicant:	Chesapeake Appalachia LLC
Facility Name:	Michael Ratcliffe Pad
Location:	Ohio County
NAICS Code:	211111
Application Type:	Construction
Received Date:	September 27, 2012
Engineer Assigned:	David Keatley
Fee Amount:	$2,000
Date Fee Received:	October 1, 2012
Complete Date:	February 13, 2013
Due Date:	May 14, 2013
Applicant Ad Date:	September 20, 2012
Newspaper:	*The Intelligencer*
UTM's:	Easting: 536.891 km Northing: 4,444.301 km Zone: 17
Description:	Installation of one (1) 145 bhp engine, one (1) 1.00 MMBTU/hr GPU burner, one (1) 1.5 MMBTU/hr line heater, one (1) 0.5 MMBTU/hr heater treater, three (3) 400 bbl condensate tanks, three (3) 400 bbl produced water tanks, and two (2) 15 MMBTU/hr vapor combustors.

DESCRIPTION OF PROCESS

The facility is an oil and natural gas exploration and production facility, responsible for the production of natural gas. Storage of condensate and produced water will also be on-site. Condensate, gas, and water come from one (1) wellhead to one (1) gas production unit (GPU), where the first state of separation occurs. The gas from the GPU will be sent to the gas sales pipeline. Liquids (condensate and produced water) from the GPU will be sent to one (1) 0.5 MMBTU/hr heater treater (EU-HT1). The flash gas from the heater

treater will be sent to one (1) natural gas-fired flash gas compressor engine (EU-ENG1) to be compressed and will exit the facility through the gas sales pipeline. The natural gas fired compressor engine is a four-stroke rich-burn Caterpillar G3306 NA equipped with a NSCR catalyst which will reduce the emissions of NOx, CO, and VOCs. Produced water from the heater treaters flows into the produced water storage tanks EU-TANKS-PW. There are three (3) 12,400 gallon water storage tanks. Condensate flows from the heater treater into the two low-pressure towers. Flash gases from the low-pressure tower(s) are routed via hard-piping to a vapor combustor (APC-COMB-LPT) to be burned with at least 98% combustion efficiency. Condensate flows from the low-pressure towers to the condensate storage tanks EP-TANKS-COND. There are three (3) 12,400 gallon condensate tanks. Condensate and produced water are transported offsite via truck. Truck loading emissions will be controlled with vapor return, which has a 70% capture efficiency and then routed to vapor combustor APC-COMB-TKLD for at least 98% destruction efficiency. Working, breathing, and flashing vapors from the condensate and produced water storage tanks will be routed to avapor combustor APC-COMB-TKLD to be burned with at least 98% combustion efficiency. Each vapor combustor has a natural gas-fired pilot EU-PILOTS to ensure a constant flame for combustion. A line heater (EU-LH1) may be used during the beginning phase of facility operations.

SITE INSPECTION

Steven J. Sobutka from the DAQ's Compliance and Enforcement performed a site visit on October 15, 2012. The access road for this facility is at least 300 feet uphill from Long Run Road. The area is sparsely populated. The well pad is bordered mostly by woods. The nearest residence appears to be the Ratcliffe residence which is at the bottom of the access road on the right of Long Run Road. The residence is 300+ ft from the well pad site.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The Caterpillar Engine emission factors are from the catalyst manufacturer (CM), the engine manufacturer (EM), and AP-42. Emission factors from the EM in g/bhp-hr are: VOC, 0.49; and formaldehyde, 0.27. Emissions factors for the CM in g/bhp-hr are: NO_x, 1.0; and CO, 2.0. The emission factors from AP-42 in lb/MMBTU are: PM and PM_{10}, 0.00999; and SO_2, 0.000588.

The GPU burner(s), Heater Treater(s), and Line Heater(s) use emission factors from AP-42. The emission factors in lb/MMscf are: NO_x, 100; CO, 84; SO_2, 0.6; PM, 7.6; and VOC, 5.5.

Emissions for EP-TANKS-COND working and breathing emissions were estimated using TANKS 4.0.9d and the flash emissions were estimated using ProMax. The Vapor Combustors are considered to have a 98% efficiency.

The emissions from the other tanks were considered negligible due to the combination of small tank size and low vapor pressure of tank contents.
The following table lists the controlled estimated emissions:

Source ID	Emission Source	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (tpy)
EU-ENG1	Flash Gas Compressor Engine Caterpillar 3306 NA 145 bhp	NO_x	0.32	1.40
		CO	0.64	2.80
		VOC	0.16	0.67
		PM	0.02	0.09
		PM_{10}	0.02	0.09
		Acetaldehyde	<0.01	0.02
		Acrolein	<0.01	0.01
		Benzene	<0.01	0.01
		Formaldehyde	0.09	0.38
		Methanol	<0.01	0.02
		CO_2e	155.18	679.70
EU-GPU1	GPU Burner 1 1.00 MMBTU/hr	NO_x	0.11	0.48
		CO	0.09	0.39
		VOC	0.01	0.03
		PM	0.01	0.04
		PM_{10}	0.01	0.04
		CO_2e	117.00	512.48
EU-LH1	Line Heater 1 1.5 MMBTU/hr	NO_x	0.17	0.74
		CO	0.14	0.61
		VOC	0.01	0.04
		PM	0.01	0.06
		PM_{10}	0.01	0.06
		CO_2e	175.51	767.96
EU-HT1	Heater Treater 1 0.5 MMBTU/hr	NO_x	0.06	0.26
		CO	0.05	0.22
		VOC	<0.01	0.01
		CO_2e	58.50	256.24
EP-TANKS-COND	Three (3) Condensate Tanks 400-bbl	VOC	0.23	0.99
		n-Hexane	0.01	0.06
		Xylenes	<0.01	0.01
EP-TANKS-PW	Three (3) Produced Water Tanks 400-bbl	VOC	<0.01	0.01
EP-LOAD-COND	Condensate Truck Loading 6,132,000 gallons/year	VOC	1.30	5.69
		n-Hexane	0.08	0.33
		Toluene	<0.01	0.02
		Ethylbenzene	0.01	0.02
		Xylenes	0.02	0.08
		CO_2e	0.16	0.71

EP-LOAD-PW	Produced Water Truck Loading 6,132,000 gallons/year	VOC	0.01	0.06
		CO_2e	0.16	0.71
APC-COMB-LPT	One (1) Low-Pressure Tower Vapor Combustor 15 MMBTU/hr	NO_x	2.07	9.07
		CO	4.13	18.09
		VOC	4.08	21.02
		PM	0.05	0.22
		PM_{10}	0.05	0.22
		Benzene	<0.01	0.01
		n-Hexane	0.13	0.57
		Toluene	0.01	0.04
		Ethylbenzene	0.01	0.04
		Xylenes	0.03	0.13
		CO_2e	1755.05	7687.13
APC-COMB-TKLD	One (1) Tanks/Loading Vapor Combustor 15 MMBTU/hr	NO_x	2.07	9.07
		CO	4.13	18.09
		VOC	0.29	1.27
		PM	0.05	0.22
		PM_{10}	0.05	0.22
		n-Hexane	0.01	0.04
		Xylenes	<0.01	0.02
		CO_2e	1755.05	7687.13
EU-PILOTS	Two (2) Vapor Combustor Pilots 50 scf/hr	NO_x	0.01	0.04
		CO	0.01	0.04
		CO_2e	10.59	46.39
EU-FUG	Fugitive Emissions	VOC	0.48	2.09
		CO_2e	7.14	31.72

The following table represents the controlled total facility emissions:

Pollutant	Maximum Annual Facility Wide Emissions (tons/year)
Nitrogen Oxides	21.06
Carbon Monoxide	40.24
Volatile Organic Compounds	31.89
Particulate Matter	0.64
PM_{10}	0.64
Sulfur Dioxide	0.01
Formaldehyde	0.38
Acetaldehyde	0.02
Acrolein	0.01
Benzene	0.03
n-Hexane	1.82
Ethylbenzene	0.13
Methanol	0.02
Toluene	0.13
Xylenes	0.44
Total HAPs	2.69
Carbon Dioxide Equivalent	17,670.92

The following table indicates the control device efficiencies that are required for this facility:

Emission Unit	Pollutant	Control Device	Control Efficiency
EU-ENG1 Compressor Engine	Nitrogen Oxides	Non Selective Catalytic Reduction (NSCR)	92.58 %
	Carbon Monoxide		85.15 %
EU-TANKS-COND, EU-TANKS-PW Storage Tanks	Volatile Organic Compounds	Vapor Combustor	98.00 %
	Total HAPs		98.00 %
EU-LOAD-COND, EU-LOAD-PW Loadout Racks	Volatile Organic Compounds	Vapor Return/ Combustion	70.00 %

REGULATORY APPLICABILITY

Unless otherwise stated WVDEP DAQ did not determine whether the permittee is subject to an area source air toxics standard requiring Generally Achievable Control Technology (GACT) promulgated after January 1, 2007 pursuant to 40 CFR 63, including the area source air toxics provisions of 40 CFR 63, Subpart ZZZZ.

The following rules apply to this facility:

45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers)

The purpose of 45CSR2 (Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers) is to establish emission limitations for smoke and particulate matter which are discharged from fuel burning units.

45CSR2 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 4 (weight emission standard), 5 (control of fugitive particulate matter), 6 (registration), 8 (testing, monitoring, recordkeeping, reporting) and 9 (startups, shutdowns, malfunctions). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The heat input of all of the proposed fuel burning units (EU-GPU1, EU-HT1, and EU-LH1) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR2. However, CHK would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

45CSR4 (To Prevent and Control the Discharge of Air Pollutants into the Open Air which Causes or Contributes to an Objectionable Odor or Odors)

This facility shall not cause the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public. 45CSR4 states that an objectionable odor is an odor that is deemed objectionable when in the opinion of a duly authorized representative of the Air Pollution Control Commission (Division of Air Quality), based upon their investigations and complaints, such odor is objectionable.

45CSR6 (To Prevent and Control Air Pollution from the Combustion of Refuse)

The purpose of this rule is to prevent and control air pollution from combustion of refuse.

CHK has two (2) vapor combustors at the facility. The vapor combustors are subject to section 4, emission standards for incinerators. The vapor combustors have an allowable emission rate of 1.01 pounds of particulate matter per hour. Each vapor combustor has an emission limit of 0.05 pounds of particulate matter per hour. Therefore, the facility's vapor combustors should not exceed the threshold due to this rule. The facility will

demonstrate compliance by maintaining records of the amount of natural gas consumed by the vapor combustors and the hours of operation. The facility will also monitor the flame of the vapor combustors and record any malfunctions that may cause no flame to be present during operation. The opacity limit for the is flare is 20%.

45CSR10 (To Prevent and Control Air Pollution from the Emissions of Sulfur Oxides)

45CSR10 states that any fuel burning unit that has a heat input under ten (10) million B.T.U.'s per hour is exempt from sections 3 (weight emission standard), 6 (registration), 7 (permits), and 8 (testing, monitoring, recordkeeping, reporting). However, failure to attain acceptable air quality in parts of some urban areas may require the mandatory control of these sources at a later date.

The heat input of all of the proposed fuel burning units (EU-GPU1, EU-LH1, and EU-HT1) are below 10 MMBTU/hr. Therefore, these units are exempt from the aforementioned sections of 45CSR10.

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

45CSR13 applies to this source due to the fact that the changes proposed under this permitting action results in an emissions increase above permitting thresholds. Therefore, CHK is required to submit a construction application. CHK has published the required Class I legal advertisement notifying the public of their permit application.

45CSR16 (*Standards of Performance for New Stationary Sources Pursuant to 40CFR60)*

45CSR16 incorporates by reference the standards of performance for new stationary sources (40CFR60). This facility has three (3) wells subject to 40CFR60 Subpart OOOO, one engine subject to 40CFR60 Subpart JJJJ and therefore this facility is subject to 45CSR16.

45CSR22 (Air Quality Management Fee Program)

This facility is a minor source, not subject to 45CSR30, and the NSPS which this facility is subject to are Title V exempt. CHK is required to keep their Certificate to Operate current. CHK paid $1,000 construction application fee and paid a $1,000 NSPS fee.

40CFR60 Subpart JJJJ (Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE))

40CFR60.4230 states that a source that commenced construction after June 12, 2006 whose SI ICE was less than 500 hp and was manufactured on or after July 1, 2008 is

subject to this rule. CHK has proposed to install one (1) 145 HP SI ICE which is subject to this regulation.

40CFR60 Subpart OOOO (Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution)

EPA issued it new source performance standards (NSPS) and air toxics rules for the oil and gas sector on April 17, 2012. 40CFR60 Subpart OOOO establishes emission standards and compliance schedules for the control of volatile organic compounds (VOC) and sulfur dioxide (SO_2) emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011. The following affected sources which commence construction, modification or reconstruction after August 23, 2011 are subject to the applicable provisions of this subpart:

a. Each gas well affected facility, which is a single natural gas well.

The gas wells that currently exist at the Michael Ratcliffe Pad were drilled principally for the production of natural gas and were done so after August 23, 2011. Therefore, these wells would be considered affected facilities under this subpart.

b. Each centrifugal compressor affected facility, which is a single centrifugal compressor using wet seals that is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your centrifugal compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A centrifugal compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There are no centrifugal compressors at the Michael Ratcliffe Pad. Therefore, this section would not apply.

c. Each reciprocating compressor affected facility, which is a single reciprocating compressor located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment. For the purposes of this subpart, your reciprocating compressor is considered to have commenced construction on the date the compressor is installed (excluding relocation) at the facility. A reciprocating compressor located at a well site, or an adjacent well site and servicing more than one well site, is not an affected facility under this subpart.

There is one (1) reciprocating compressor associated with EU-ENG1 located at the Michael Ratcliffe Pad. This compressor was is after the effective date of this rule. However, the rule specifically states that any reciprocating compressor

located at a well site is not an affected facility under this subpart. Therefore, this section would not apply.

d. 1. Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller operating at a natural gas bleed rate greater than 6 scfh which commenced construction after August 23, 2011, and is located between the wellhead and the point of custody transfer to the natural gas transmission and storage segment and not located at a natural gas processing plant.

2. Each pneumatic controller affected facility, which is a single continuous bleed natural gas-driven pneumatic controller which commenced construction after August 23, 2011, and is located at a natural gas processing plant.

The pneumatic controllers at this facility will be intermittent bleed; therefore, this section would not apply.

e. Each storage vessel affected facility, which is a single storage vessel, located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment.

40CFR60 Subpart OOOO defines a storage vessel as a unit that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provides structural support and is designed to contain an accumulation of liquids or other materials. The following are not considered storage vessels:

1. Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If the source does not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.

2. Process vessels such as surge control vessels, bottoms receivers or knockout vessels.

3. Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

This rule requires that the permittee determine the VOC emission rate for each storage vessel affected facility utilizing a generally accepted model or calculation methodology within 30 days of startup, and minimize emissions to the extent practicable during the 30 day period using good engineering practices. For each

storage vessel affected facility that emits more than 6 tpy of VOC, the permittee must reduce VOC emissions by 95% or greater within 60 days of startup.

All three (3) EP-TANKS-COND tanks located at the Michael Ratcliffe Pad emit more than 6 tpy of VOC (16.58 tpy each). CHK has proposed to install vapor combustors to capture 98% of the VOC emissions from the condensate tanks, so they are not subject to this section of this regulation.

f. The group of all equipment, except compressors, within a process unit is an affected facility.

1. Addition or replacement of equipment for the purpose of process improvement that is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

2. Equipment associated with a compressor station, dehydration unit, sweetening unit, underground storage vessel, field gas gathering system, or liquefied natural gas unit is covered by §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart if it is located at an onshore natural gas processing plant. Equipment not located at the onshore natural gas processing plant site is exempt from the provisions of §§60.5400, 60.5401, 60.5402, 60.5421 and 60.5422 of this subpart.

3. The equipment within a process unit of an affected facility located at onshore natural gas processing plants and described in paragraph (f) of this section are exempt from this subpart if they are subject to and controlled according to subparts VVa, GGG or GGGa of this part.

The Michael Ratcliffe Pad is not a natural gas processing plant. Therefore, LDAR for onshore natural gas processing plants would not apply.

g. Sweetening units located at onshore natural gas processing plants that process natural gas produced from either onshore or offshore wells.

1. Each sweetening unit that processes natural gas is an affected facility; and

2. Each sweetening unit that processes natural gas followed by a sulfur recovery unit is an affected facility.

3. Facilities that have a design capacity less than 2 long tons per day (LT/D) of hydrogen sulfide (H_2S) in the acid gas (expressed as sulfur) are required to comply with recordkeeping and reporting requirements specified in §60.5423(c) but are not required to comply with §§60.5405 through 60.5407 and paragraphs 60.5410(g) and 60.5415(g) of this subpart.

4. Sweetening facilities producing acid gas that is completely reinjected into oil-or-gas-bearing geologic strata or that is otherwise not released to the atmosphere are not subject to §§60.5405 through 60.5407, 60.5410(g), 60.5415(g), and 60.5423 of this subpart.

There are no sweetening units at the Michael Ratcliffe Pad. Therefore, this section would not apply.

The following rules and regulations do not apply to the facility:

40CFR60 Subpart 60.18 (General Control Device and Work Practice Requirements)

40CFR60 Subpart 60.18 contains requirements for control devices when they are used to comply with applicable subparts of 40CFR60 and 40CFR61. The vapor combustor that CHK has proposed is not used to comply with one of these rules. The purpose of the vapor combustor is to control emissions from the tanks that are routed to it. However, these tanks are not subject to 40CFR60 Subpart Kb due to their size. In addition 40CFR60.18 refers to flares but makes no mention of vapor combustors, which are essentially enclosed combustion devices. Therefore, CHK is not subject to this standard.

40CFR60 Subpart Kb (Standards of Performance for VOC Liquid Storage Vessels)

40CFR60 Subpart Kb does not apply to storage vessels with a capacity less than 75 cubic meters. The tanks that CHK has proposed to install are 63.60 cubic meters each. Therefore, CHK would not be subject to this regulation.

40CFR60 Subpart KKK (Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants)

40CFR60 Subpart KKK applies to onshore natural gas processing plants that commenced construction after January 20, 1984. The *Michael Ratcliffe* Pad is not a natural gas processing plant, therefore, CHK would not be subject to this regulation.

45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants)

45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment)

The *Michael Ratcliffe* Pad is located in Ohio County which is a non-attainment county for Particulate Matter 2.5. Because Ohio County is a non-attainment county, 45CSR19 would apply to this facility.

As shown in the following table, CHK is not subject to 45CSR14 or 45CSR19 review.

Pollutant	PSD (45CSR14) Threshold (tpy)	NANSR (45CSR19) Threshold (tpy)	PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	40.24	No
Nitrogen Oxides	250	100	21.06	No
Sulfur Dioxide	250	100	0.01	No
Particulate Matter 2.5	250	100	0.64	No
Ozone (VOC)	250	NA	31.89	No
Greenhouse Gas (CO_2e)	100,000	NA	17,670.92	No

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

There will be small amounts of various non-criteria regulated pollutants emitted from the combustion of natural gas. However, due to the concentrations emitted, detailed toxicological information is not included in this evaluation.

AIR QUALITY IMPACT ANALYSIS

Based on the annual emission rates this facility will not be a major source as defined by 45CSR14, so air quality modeling was not performed.

SOURCE AGGREGATION

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

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

1. The *Michael Ratcliffe* Pad will operate under SIC code 1311 (Crude Petroleum and Natural Gas Extraction). There are surrounding wells and compressor stations operated by CHK that share the same two-digit major SIC code of 13 for oil and gas exploration and production. Therefore the *Michael Ratcliffe* Pad does share the same SIC code as the wells and surrounding compressor stations.

2. "Contiguous or Adjacent" determinations are made on a case by case basis. These determinations are proximity based, and it is important to focus on this and whether or not it

meets the common sense notion of a plant. The terms "contiguous" or "adjacent" are not defined by USEPA. Contiguous has a dictionary definition of being in actual contact; touching along a boundary or at a point. Adjacent has a dictionary definition of not distant; nearby; having a common endpoint or border.

The closest well to the *Michael Ratcliffe* Pad is over one quarter (1/4) mile away. Operations separated by these distances do not meet the common sense notion of a plant. Therefore, the properties in question are not considered to be on contiguous or adjacent property.

3. According to CHK, none of the wells in the area are under common control with the *Michael Ratcliffe* Pad. The *Michael Ratcliffe* Pad is operated by CHK but is owned and controlled by a group of non-affiliated companies. Through proprietary agreements, CHK's operation of *Michael Ratcliffe* Pad is controlled by the system owners. The ownership and control of the wells in the area may be distinct for each well and is not necessarily known by CHK. The owners and operators of the wells each may take their gas in kind and consequently affect the operation of the wells in which they have an ownership interest. Furthermore, no well is dependent on the operation of *Michael Ratcliffe* Pad to function, nor is the *Michael Ratcliffe* Pad dependent on any specific well to operate. From this analysis, CHK is not under common control with other wells in the area.

Because the facilities are not considered to be on contiguous or adjacent properties and are not fully under control of the same person, the emissions from the *Michael Ratcliffe* Pad should not be aggregated with other facilities in determining major source or PSD status.

MONITORING OF OPERATIONS

CHK will be required to perform the following monitoring associated with this permit application:

1. Monitor and record quantity of natural gas consumed for all engines, and combustion sources.
2. Monitor the presence of the vapor combustor pilot flame with a thermocouple or equivalent.
3. Monitor opacity from all fuel burning units.
4. Monitor the tanks to ensure that all vapors are sent to vapor combustor.
5. Monitor the condensate truck loading to ensure that vapor return/combustion is used.

CHK will be required to perform the following recordkeeping associated with this modification application:

1. Maintain records of the amount of natural gas consumed in each combustion source.
2. Maintain records of testing conducted in accordance with the permit. Said records shall be maintained on-site or in a readily accessible off-site location
3. Maintain the corresponding records specified by the on-going monitoring requirements of

and testing requirements of the permit.

4. Maintain records of the visible emission opacity tests conducted per the permit.
5. Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility. These records shall include the natural gas compressor engines and ancillary equipment.
6. The records shall be maintained on site or in a readily available off-site location maintained by CHK for a period of five (5) years.
7. Monitor the tanks to ensure that the tanks vapors will be sent to vapor combustor.
8. Monitor the condensate truck loading to ensure that vapor return/combustion is used.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates Chesapeake Appalachia LLC's natural gas well pad site should meet all applicable requirements. It is recommended that Chesapeake Appalachia's proposed *Michael Ratcliffe* Pad should be granted a 45CSR13 construction permit for their facility.

_____
David Keatley
Permit Writer

_____
Date