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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-2826F
Plant ID No.: 051-00127
Applicant: Caiman Eastern Midstream, LLC (Caiman)
Facility Name: Fort Beeler Station
Location: Moundsville, Marshall County
SIC Code: 1321 (Extraction Plant)
NAICS Code: 211112
Application Type: Modification
Received Date: March 2, 2012
Engineer Assigned: Jerry Williams, P.E.
Fee Amount: \$2,000.00
Date Received: March 2, 2012
Complete Date: March 19, 2012
Due Date: June 17, 2012
Applicant Ad Date: February 27, 2012
Newspaper: *Moundsville Daily Echo*
UTM's: Easting: 537.23 km Northing: 4408.34 km Zone: 17
Description: Modification of a natural gas processing facility to install a third cryogenic plant. In addition, two (2) engines (2S, 4S) and a J-T Skid (9S) will be removed from operation.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-2826F:

Caiman proposes to install a 200 mmscfd processing plant to the Fort Beeler complex. The expanded facility will operate in the same manner as the current facility. It will continue to receive natural gas from local production wells (inlet gas), filter and process it through a cryogenic process to remove non-methane/ethane organics from the gas stream. The separated heavier weight organics (NGL) will be accumulated in the existing 30,000 and 60,000 gallon pressure vessels and subsequently transported by truck directly to markets or transported via pipeline to Caiman's Ohio River Facility where the NGL will either be processed through the

facility or loaded on to truck or rail from that location for a more cost-effective transportation to markets. The expanded facility will be capable of processing a total of 520 mmscfd.

Primary operation at this expanded facility will include the following:

1. Separation of free liquids from the inlet gas (new and existing equipment).
2. Dehydration of the inlet gas via molecular sieves (new and existing equipment).
3. Receipt and separation of pigging liquids into organic and aqueous phases (existing equipment).
4. Processing of the natural gas through cryogenic system (new and existing equipment).
5. Compression of the processed gas (new and existing equipment) and introduction into pipelines.
6. Accumulation of wastewater (existing equipment).
7. Accumulation of NGL (existing equipment).
8. Truck loading operations (existing equipment).

While there are no emission points from the existing and additional cryogenic process units, the operations are regulated under 40CFR60 Subpart KKK. Compliance with this rule is already a part of the current permit, therefore, no additional permit conditions are required.

The following is an overview of the new equipment associated with this application:

1. Mole-Sieve Dehydration/Regeneration. The expanded processing plant will use additional molecular sieves to dry the additional incoming gas. The objective is to prevent ice formation at cryogenic temperatures. The molecular-sieve beds are regenerated using residue gas that is heated to absorb water in the beds. The new regeneration gas heater is a 5.605 MMBTU/hr direct fired heater. The regeneration gas is a closed loop system. There are no emissions from the molecular-sieve dehydration units, only from the natural gas fired heater.
2. Cryogenic Refrigerant Pressurization. Refrigerant for the new cryogenic unit will be pressurized by compressors driven by electric motors. Local electric supplies will be the primary power source for these motors as well as for existing cryogenic units.
3. Cryogenic Plant. A third cryogenic process will be added to expand the facility's ability to extract NGL from the inlet gas. As with the existing units, the third cryogenic process consists of dropping the temperature of the gas stream to around -120° F. Refrigeration will again be provided by propane utilizing the electric motor driven compressors described above and a turbo expander process. As is currently the case, the propane refrigerant will be used to cool the natural gas stream and an expansion turbine used to rapidly expand the chilled gases, causing the temperature to drop significantly. The rapid temperature drop condenses ethane, propane, butane and other hydrocarbons in the gas stream, while maintaining methane in gaseous form. Emissions from this operation will consist of fugitive emissions of VOCs.

4. Medium Heater. A liquid in a closed loop system will be used as a heat exchange medium for the bottoms reboiler on the new de-methanizer. As with Plant 2, the liquid will be heated by a 17.4 MMBTU/hr gas fired heater.
5. Residue Compression. After leaving the new cryogenic unit, the additional natural gas stream must also be re-pressurized to the plant discharge pressure. This will be completed via three (3) compressors, each driven by an electric motor. There will be no emissions associated with this additional compression operation.
6. J-T Skid. The existing J-T Skid (Source 9S) will be shut down prior to start-up of Plant 3. Additionally, the two (2) compressor engines associated with this process (Sources 2S and 4S) will also be removed prior to start-up of Plant 3.

SITE INSPECTION

A site inspection was conducted by Steve Sobotka of the DAQ NPRO Enforcement Section on May 23, 2011. They are currently operating in compliance.

Directions as given in the permit application are as follows:

In Moundsville, take US 250 South approximately 13.5 miles. Site is located on the right on unnamed road, approximately 250 yards prior to Fork Ridge Road.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this permit application consist of a regeneration heater, medium heater, and fugitive emissions from equipment leaks. In addition, two (2) compressor engines, and one (1) J-T Skid was removed from operations. The estimated emission calculations were performed by Caiman and checked for accuracy and completeness by the writer. The following tables include the emission source and the controlled emission rate associated with this modification:

Emission Point ID	Emission Unit ID	Process Unit	Pollutant	Maximum Controlled Emission Rate	
				Hourly (lb/hr)	Annual (ton/year)
28E	28S	200 mmscf Cryogenic Unit	Volatile Organic Compounds	2.15	9.42
			Carbon Dioxide Equivalent	105	458
29E	29S	5.605 MMBtu/hr Regenerator Heater	Nitrogen Oxides	0.52	1.13
			Carbon Monoxide	0.44	0.95
			Sulfur Dioxide	0.01	0.01
			Particulate Matter-10	0.04	0.09
			Volatile Organic Compounds	0.03	0.07
			Carbon Dioxide Equivalent	622	1,361
30E	30S	17.4 MMBtu/hr Medium Heater	Nitrogen Oxides	1.60	7.00
			Carbon Monoxide	1.34	5.88
			Sulfur Dioxide	0.01	0.01
			Particulate Matter-10	0.12	0.53
			Volatile Organic Compounds	0.09	0.38
			Carbon Dioxide Equivalent	1,929	8,451
2E REMOVED	2S REMOVED	607 hp Waukesha 2895 GSI Compressor Engine REMOVED	Nitrogen Oxides	0.33	1.47
			Carbon Monoxide	2.68	11.72
			Sulfur Dioxide	0.01	0.01
			Particulate Matter-10	0.05	0.19
			Volatile Organic Compounds	0.13	0.57
			Formaldehyde	0.02	0.06
		225 hp Caterpillar	Nitrogen Oxides	0.05	0.22
			Carbon Monoxide	0.99	4.35

4E REMOVED	4S REMOVED	G342 NA Compressor Engine REMOVED	Sulfur Dioxide	0.01	0.01
			Particulate Matter-10	0.02	0.09
			Volatile Organic Compounds	0.06	0.28
			Formaldehyde	0.03	0.10
9E REMOVED	9S REMOVED	Existing JT Skid REMOVED	Volatile Organic Compounds	0.55	2.42

The following table represents the total facility emissions:

Pollutant	Maximum Annual Facility Wide Emissions Before R13-2826F (tons/year)	Maximum Annual Facility Wide Emissions After R13-2826F (tons/year)	Net Change (tons/year)
Nitrogen Oxides	88.75	95.31	6.56
Carbon Monoxide	61.00	52.00	-9.00
Volatile Organic Compounds	57.48	64.53	7.05
Particulate Matter	5.38	5.71	0.33
Sulfur Dioxide	0.31	0.34	0.03
Formaldehyde	4.67	4.51	-0.16
Total HAPs	12.92	11.99	-0.93
Carbon Dioxide Equivalent	74,437	81,050	6,613

The following table indicates the control device efficiencies that are being utilized:

Control Device ID	Control Device	Emission Unit	Pollutant	Control Efficiency
12C	Selective Catalytic Reduction (SCR)	Caterpillar 3516 LE Compressor Engine	Carbon Monoxide	95 %
			Volatile Organic Compounds	50 %
			Formaldehyde	94 %
18C 19C 20C	Selective Catalytic Reduction (SCR)	Caterpillar 3612 LE Compressor Engine	Carbon Monoxide	94 %
			Volatile Organic Compounds	50 %
			Formaldehyde	94 %
26C	Non Selective Catalytic Reduction (NSCR)	Caterpillar 398 TA Compressor Engine	Nitrogen Oxides	95%
			Carbon Monoxide	95%
			Volatile Organic Compounds	95%
			Formaldehyde	76%

REGULATORY APPLICABILITY

Applicable rules associated with this permit application are the following:

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 the facility:

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

Caiman would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average.

Any fuel burning unit having a heat input under ten (10) million B.T.U.'s per hour will be 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.

Therefore, the only fuel burning units that would not meet this exemption would be the 17.4 MMBtu/hr medium heaters (23S and 30S). The weight emission standard for this unit would be 1.57 lb/hr of particulate matter. Caiman has proposed a limit of 0.12 lb/hr, therefore this standard should be met. Caiman shall perform the prescribed testing, monitoring, recordkeeping and reporting for this unit.

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

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. No odors have been deemed objectionable.

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

Caiman would be subject to an in-stack sulfur dioxide concentration of 2,000 parts per million by volume.

Any fuel burning unit having a heat input under ten (10) million B.T.U.'s per hour will be 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.

Therefore, the only fuel burning units that would not meet this exemption would be the 17.4 MMBtu/hr medium heaters (23S and 30S). The weight emission standard for this unit would be 53.94 lb/hr of particulate matter. Caiman has proposed a limit of 0.01 lb/hr, therefore this standard would be met. Caiman shall perform the prescribed testing, monitoring, recordkeeping and reporting for this unit.

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 Caiman's medium heater (30S) installation is subject to a substantive requirement (40CFR60 Subpart Dc). The emissions increase associated with this permit application is below the emissions modification threshold. Caiman has published the required Class I legal advertisement notifying the public of their permit application, and paid the appropriate application fee (modification).

45CSR16 (Standards of Performance for New Stationary Sources Pursuant to 40 CFR Part 60)

45CSR16 applies to this source by reference of, 40CFR60, Subparts Dc and KKK. Caiman is subject to the recordkeeping, monitoring, and testing required by 40CFR60, Subparts Dc and KKK.

45CSR30 (Requirements for Operating Permits)

This permit does not affect 45CSR30 applicability, the source is a nonmajor source subject to 45CSR30. The facility is not subject to the permitting requirements of 45CSR30 and is classified as a deferred source.

40CFR60 Subpart Dc (Standards of Performance for Small Industrial/Commercial/Institutional Steam Generating Units)

Caiman is subject to all applicable notifications, recordkeeping, and reporting requirements present in 40CFR60 Subpart Dc. 40CFR60 Subpart Dc applies to this source due to the maximum heat input of the medium heater (17.4 MMBtu/hr). In accordance with 40CFR60 Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, the applicant shall monitor all applicable requirements of 40CFR60 Subpart Dc.

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 Fort Beeler Station is subject to this rule due to the natural gas liquids extraction plant. Caiman must meet the LDAR requirements of Subpart KKK, which includes the provisions referenced in 40CFR60 Subpart VV.

The following rules do not apply to the facility:

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)

Pollutant	PSD (45CSR14) Threshold (tpy)	NANSR (45CSR19) Threshold (tpy)	Fort Beeler PTE (tpy)	45CSR14 or 45CSR19 Review Required?
Carbon Monoxide	250	NA	52.00	No
Nitrogen Oxides	250	100	95.31	No
Sulfur Dioxide	250	100	0.34	No
Particulate Matter 10	250	NA	5.71	No
Ozone (VOC)	250	NA	64.53	No
Greenhouse Gas (CO ₂ e)	100,000	NA	81,050	No

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

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

Modeling was not required of this source due to the fact that the facility is not subject to 45CSR14 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollutants) as seen in the table listed in the Regulatory Discussion Section.

SOURCE AGGREGATION DETERMINATION

“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.

1. The Fort Beeler Processing Facility will operate under SIC code 1321 (Natural Gas Liquid Extraction), while the proposed Ohio River Fractionation Facility also operates under SIC Code 1321. Therefore, the two (2) facilities do belong to the same industrial grouping.
2. Both the Ohio River Fractionation Facility and Fort Beeler Processing Facility are owned and operated by Caiman.
3. The Ohio River Fractionation Facility will be located approximately 11 miles from the Fort Beeler Processing Facility. This is not considered to be on contiguous or adjacent property as Caiman does not own the land in between the facilities, and the facilities are not mutually dependent.

Caiman currently operates the Fort Beeler Processing Facility under Permit R13-2826E. The original Fort Beeler permit was issued on March 29, 2010. Therefore, Caiman was operating the Fort Beeler facility independent of the Ohio River facility.

The purpose of the Fort Beeler facility is to remove natural gas liquids (NGL) including ethane, propane, butane and other higher molecular weight organics from the raw natural gas stream produced from nearby wells. This brings the quality of the natural gas to within contractual standards making it suitable for sale to and distribution by interstate pipelines.

The purpose of the Ohio River facility is to take the NGL removed from the produced gas and separate them into individual components such as propane and butane. Caiman does not own the natural gas; they only provide a third party service and further process the gas for these parties.

The Fort Beeler facility currently trucks the NGL to either third party fractionators or to a rail car loading facility. Approximately 98% of the NGL product produced at Fort Beeler is owned by customers for whom Caiman provides natural gas processing services. This product is marketed for the customers by an independent, third party company that has been contracted to market the product for customers that do not desire to market it on their own. The third party marketing company determines how the product will be transported, where it will be transported, negotiates the contracts under which third party fractionators perform their NGL processing, and then markets the final product. Caiman’s only connection will be that that they will attempt to serve the needs of these customers by offering the use of the Ohio River facility.

Of this 98%, approximately one half of the product being produced at the Fort Beeler facility is controlled by one entity which has sole control regarding the manner in which the product is marketed and has no specific tie to Caiman. Its product is currently delivered to a third party fractionator in Pennsylvania.

The Ohio River facility will initially possess the capability to receive 210,000 gallons per day of raw condensate or NGL product by truck, and 100,000 gallons per day of raw condensate or NGL product by rail. Caiman is also constructing two (2) pipelines to the Ohio River facility. One will be a pipeline for condensate from producing well locations with a capacity of 250,000 gallons per day. The second pipeline will be from the Fort Beeler facility for NGL product with a capacity of 2,100,000 gallons per day. Therefore, the Ohio River facility will be able to receive product from three (3) sources other than Fort Beeler initially, with the possibility for others in the future.

The Ohio River site was chosen based on transportation access (highway and rail), land availability, and suitable size. The Fort Beeler facility and the Ohio River facility do not share facilities or equipment.

The Fort Beeler and Ohio River facilities do have the same industrial grouping and are owned by the same company and are under common control. However, the two (2) facilities are not considered “contiguous or adjacent”. The facilities are separated by 11 miles and Caiman does not own the land in between the two (2) facilities. Furthermore, the facilities are not mutually dependent. The Fort Beeler facility has been in operation more than one (1) year currently and could continue to operate without the Ohio River facility. In addition, as explained in item 3, the Ohio River facility also has the capability of operating without the Fort Beeler facility. Caiman will market the ability to use both facilities. However, Caiman will not have an ownership interest in the product and will have no control over the Fort Beeler product unless the owner chooses Caiman to utilize its services further.

Because of the reasons listed above, the emissions from these two (2) facilities should not be aggregated in determining major source or PSD status.

CHANGES TO PERMIT R13-2826E

The following is an overview of each of the requested modifications:

Regenerator Heater (29S). The expanded processing plant will use additional molecular sieves to dry the additional incoming gas. The objective is to prevent ice formation at cryogenic temperatures. The molecular-sieve beds are regenerated using residue gas that is heated to absorb water in the beds. The new regeneration gas heater is a 5.605 MMBTU/hr direct fired heater (29S). The regeneration gas is a closed loop system. There are no emissions from the molecular-sieve dehydration units, only from the natural gas fired heater.

Cryogenic Plant (28S). A third cryogenic process will be added to expand the facility's ability to extract NGL from the inlet gas. As with the existing units, the third cryogenic process consists of dropping the temperature of the gas stream to around -120° F. Refrigeration will again be provided by propane utilizing the electric motor driven compressors described above and a turbo expander process. As is currently the case, the propane refrigerant will be used to cool the natural gas stream and an expansion turbine used to rapidly expand the chilled gases, causing the temperature to drop significantly. The rapid temperature drop condenses ethane, propane, butane and other hydrocarbons in the gas stream, while maintaining methane in gaseous form. Emissions from this operation will consist of fugitive emissions of VOCs.

Medium Heater (30S). A liquid in a closed loop system will be used as a heat exchange medium for the bottoms reboiler on the new de-methanizer. As with Plant 2, the liquid will be heated by a 17.4 MMBTU/hr gas fired heater.

The following equipment will be removed from operation:

1. Emission Unit 2S. 607 HP Waukesha 2895 GSI natural gas fired compressor engine.
2. Emission Unit 4S. 225 HP Caterpillar G342 NA natural gas fired compressor engine.
3. Emission Unit 9S. 42 mmscf/d J-T Skid.

MONITORING OF OPERATIONS

Caiman will be required to perform the following monitoring:

1. Monitor and record quantity of natural gas consumed for all engines, and combustion sources.
2. Monitor all applicable requirements of 40CFR60 Subparts Dc and KKK.
3. Monitor and record the operating hours of the flare.
4. Monitor the presence of the flare pilot flame using a thermocouple or any other equivalent device to detect the presence of a flame at the flare.

Caiman will be required to perform the following recordkeeping:

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 Caiman for a period of five (5) years.
7. Maintain records of all applicable requirements of 40CFR60 Subparts Dc and KKK.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates Caiman's Fort Beeler Station meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Marshall County location should be granted a 45CSR13 modification permit for their facility.

Jerry Williams, P.E.
Engineer

Date