



west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304-2345
Phone: 304 926 0475 • Fax: 304 926 0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

MEMORANDUM

To: Bev McKeone, NSR Program Manager
From: Ed Andrews, Reviewing Engineer 
Date: May 1, 2015
Subject: Class II A/U Request of Permit R13-3048 (R13-3048A) for Appalachia Midstream Services, L.L.C.

On December 12, 2014, Appalachia Midstream Services requested a Class II Administrative Update to Permit R13-3048. This request calls for replacing a generator set with a more powerful engine and replacing two of the three 55 MMSCFD dehydration units with just one 110 MMSFD dehydration unit with a 2.0 MMBtu/hr reboiler. The station is still under construction at this time.

The proposed engine will have an additional 100 brake horsepower of power output compared to the engine originally permitted under Permit R13-3048. This proposed engine will be subject to the same provisions of Subpart JJJJ of the New Source Performance Standards (NSPS) which requires an initial compliance test for non-certified engines and follow-up testing once every 8,760 hours of operation or every three years whichever comes first. The following table is a comparison of the emissions between the two engines.

	Cummins – GTA28		Ballard	Net Difference
Engine Power Output (hp)	701		605	96
	Emissions			
Pollutant	(lb/hr)	(TPY)	(TPY)	(TPY)
Oxides of Nitrogen (NO _x)	3.09	3.38	2.92	0.46
Carbon Monoxide (CO)	6.18	6.77	5.84	0.93
Volatile Organic Compounds (VOCs)	1.54	1.66	2.04	-0.38
Formaldehyde* (HCOH)	0.11	0.12	0.25	-0.13
Carbon Dioxide (CO ₂)	618.28	677.02	1,450	-772.98

Section 7.0 of the Permit R13-3048 was revised to address the proposed engine and include the applicable requirements of Subpart JJJJ. Because the conditions in Section address the applicable requirements of Subpart JJJJ, the reference to EGGEN-2 in Section 8.0 was omitted.

All three of dehydration units in the Permit R13-3048 was originally permitted with flash tanks that supplied the reboilers as the primary fuel source and any excess flash gas was recycled for recompression in the suction side the station. The still vent of these dehydration units was vented to a condenser with the non-condensable gases been routed to the side of the reboiler burner.

The problem that the writer noticed is that the flash tank off gas contains a significant concentration of VOCs. The typical destruction efficiency for boilers (reboilers) would be 95%. Second, the heating value and quantity of the flash tank off gases usually exceed the heat input rating of the burner for the reboiler. Third, it was discovered that the dehydration units were equipped with electric and gas injection pumps.

To address these emissions, the heat value (net heating value) of the flash tank off gas for each dehydration unit was determined. From this heating value, the maximum actual mass rate of fuel was determined, which determined the mass rate of VOCs being introduced in the reboiler. If the VOCs are introduced into the burner as the primary fuel source, then EPA assumes the reboiler has a destruction efficiency of 95%. Based on the submitted piping and instrumentation diagrams, the flash tank off gas will be routed in such a manner.

Table #2 Summary of the Dehydration Units				
Dehydration Unit	EUDHY-1 (55 MMSCFD)		EUDHY-2 (110 MMSCFD)	
MDHI (MMBtu/hr)	1.0		2.0	
Glycol Pump Type	Electric	Gas Injection	Electric	Gas Injection
Net Heating value (Btu/lb)	19493.2	20,363.6	19,831	20,190
Total Mass of the Flash Tank Off Gas (lb/hr)	119.2	496.23	117.3	253.2
Fuel Mass Required for MDHI	51.3	49.11	100.85	99.06
Ratio of Required For MDHI to Total Mass	0.43	0.099	0.86	0.39
Total VOC in the Flash Tank Off Gas lb/hr	46.56	138.82	46.07	70.67
VOCs going to	20.02	13.74	39.62	27.56

Volatile Organic Compounds	2.51	8.58
Total HAPs	0.59	2.59

* Annual VOC emissions only includes the use of flash tank off gas 50% of the time.

- 10.1.5. The emissions released from emission point EPRBL-2 (the combustion stack of the reboiler) shall not exceed the following limits:

Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (ton/year)
Nitrogen Oxides	0.15	0.65
Carbon Monoxide	0.13	0.55
Volatile Organic Compounds	3.56	10.85*
Total HAPs	0.31	1.24

* Annual VOC emissions only includes the use of flash tank off gas 50% of the time.

- 10.1.6. The still vent of each dehydration unit shall be vented to a dedicated BTEX Condenser and BTEX Accumulator (2-phase separator) through a closed vent system. The non-condensable gas from each BTEX Accumulator shall be vented back to the respective reboiler through a closed vent system.
- 10.1.7. Each glycol dehydration unit/still column (EPSTL-1 & EPSTL-2) shall be equipped with a fully functional BTEX Buster (APCCOND-1 & APCCOND-2) at all times. The control device(s) (APCCOND-1 & APCCOND-2,) shall be operated according to manufacturer's specifications, and shall be properly maintained in a manner which prevents the unit from freezing.
- 10.1.8. Each dehydration unit (EPRBL-1 and EPRBL-2,) shall be designed and operated in accordance with the following:
- a. The non-condensable gas from the BTEX Accumulator shall be routed to the reboiler and combusted.
 - b. The flash tank off-gases from each flash tank shall be routed to the pilot light for each burner of the reboiler, to the burner of the reboiler, and/or flash gas header to be re-injected in the suction line for recompression. The routing of the flash tank off-gases shall be done through a closed vent system.
 - c. The pilot light for each reboiler burner shall be lit at all times when the dehydration unit is in operation.
 - d. The maximum flow rate of glycol through the Dehydration Unit EUDHY-1 shall not exceed 22 gpm. The permittee may install two Kimray 45015PV (max 7.5 gpm for each pump) glycol pumps piped in parallel and one electric driven pump with a name plate rating of no greater than 22 gpm. This dehydration unit shall only be operated with the two Kimray pumps or one electric pump in service.
 - e. The maximum flow rate of glycol through the Dehydration Unit EUDHY-2 shall not exceed 24.1 gpm. The permittee may install one Kimray 45015PV glycol pump and two electric driven pumps with a name plate rating of no greater than 22 gpm. This dehydration unit shall only be operated with either the one Kimray pump or one electric pump in service.

- f. The maximum temperature of the outlet stream from the BTEX Condenser shall not be above 120°F on a 3-hour average basis.

The monitoring of the outlet temperature of the BTEX condenser was added in the monitoring section of 10.2.3., which is presented in the following:

- 10.2.3. The permittee shall monitor the temperature of the outlet stream of each BTEX Condenser (APCCOND-1 & APCCOND-2) on a daily basis for the purpose of demonstrating compliance with Condition 10.1.8.f. The permittee may use a portable temperature measuring device. Only one measurement is required to be measured per day if the measured temperature is at or less than 120°F. For readings above 120°F, the permittee shall take additional measurements in equal time intervals to develop a 3-hour average. Records of such monitoring shall be maintained in accordance with Condition 3.4.1. and include the time and date of measurements.

The potential emissions established in Permit R13-3048 were below 100 tpy for all criteria pollutants including fugitive emissions from leaking components. This action brings the overall VOC emissions above 100 tpy major Title V threshold to 100.42 tpy of VOC. However, 12.87 tons of this 100.43 tpy is fugitive VOC emissions from component leaks. Thus, the actual PTE for the Buffalo Station for VOC is 87.55 tpy, which is less than the Title V major source threshold value.

45 CSR §30-2.26.b. states that the fugitive emission of a stationary source shall not be considered in determining whether it is a major stationary source for applicability under 45 CSR 30, unless the source belongs to one of the categories listed. The only source category that is near the proposed operation is 45 CSR §30-2.26.b.38. – Natural Gas Processing. Natural gas processing as defined in Part 60 as any processing site engaged in the extraction of natural gas liquids for field gas. The Buffalo Station will only be engaged in compressing and removing water from the field gas. Thus, fugitive emissions should not be aggregated in the facility's potential to emit for applicability under 45 CSR 30. Therefore, the Buffalo Station will remain as a non-major source and subject to 45 CSR 22 as a 8D source for having compressor engines with power output greater than 1000 hp.

The increase of VOC emissions for this change is 2.83 pounds per hour and 5.39 tpy, which is less than the modification threshold values of 45 CSR 13. Total HAPs increased by 2.18 tpy. Again, this is less than the modification threshold value of 45 CSR13. The facility's PTE for total HAPs is 23.78 tpy. The controls were made federally enforceable under Permit R13-3048. Thus, the changes in the permitting action would increase the PTE for benzene just up to 0.83 tpy. Thus, the less than one ton per year of benzene exemption would still apply for this facility with regards to Subpart HH of Part 63.

The source filed a complete application, published a class I legal ad in the *Intelligencer* on December 10, 2014, and paid the Class II Application fee and NSPS fee on December 12, 2014. The information provided in the permit application indicates that the applicant meets all the requirements of applicable regulations. Therefore, it is recommended that the Buffalo Station should be granted a Class II Administrative Update in accordance with 45CSR13.