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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3260
Plant ID No.:	017-00157
Applicant:	Antero Resources Corporation (Antero)
Facility Name:	Sandstrom Water Treatment Facility
Location:	Greenwood, Doddridge County
NAICS Code:	213112 (Support Activities for Oil and Gas Operations)
Application Type:	Construction
Received Date:	July 22, 2015
Engineer Assigned:	Jerry Williams, P.E.
Fee Amount:	$2,000.00
Date Received:	July 22, 2015
Complete Date:	August 19, 2015
Due Date:	November 17, 2015
Applicant Ad Date	July 28, 2015
Newspaper:	*The Herald Record, The Ritchie Gazette*
UTM's:	Easting: 509.222 km Northing: 4,346.659 km Zone: 17
Description:	Water treatment facility

NON-CONFIDENTIAL

Promoting a healthy environment.

DESCRIPTION OF PROCESS

The following process description was taken from Permit Application R13-3260:

The water treatment facility was designed to treat wastewater associated with shale development to an effluent water purity suitable for surface discharge or reuse with future oil and gas operations. The treatment system includes the following processes:

- Brine pre-treatment system including truck offloading, clarification, equalization, solids contact clarifier for selective ion removal and equalization
- Thermal brine treatment system
- Post-treatment system

All processes are planned to operate 24 hours a day 7 days a week. A basic process flow diagram (PFD) of the entire treatment process is provided in Attachment F of the permit application.

Both flowback water and produced water originate from the wellhead. Flowback water is categorized as the water that returns during the first 30 days of the well's production while produced water is all water thereafter. Water quality varies for water coming out of the wellhead with most dissolved constituents making up the total dissolved solids generally increasing over time then stabilizing for the life of the well. This gradual increase in total dissolved solids typically occurs between day 1 and day 180 of a wells production. The VOC content of the water over this period is not believed to vary dramatically as both waters go through separation processes to remove both gas and condensate.

WVDEP Office of Oil and Gas regulation 35CSR8.9.1.b.3.A. defines flowback as the water recovered during the first thirty (30) days of the flowback period. All additional water produced from the wellbore after thirty (30) days is classified as produced water.

Upstream Equipment – Truck Off-loading Station

The influent to the water treatment facility will be delivered by trucks. An offloading station will be provided with 16 truck bays (P-1051). The water will flow from offload bays to the clarifiers (TK-1055A and TK-1055B). All pumping units at the facility are electric-powered and have no associated emissions.

Pre-Treatment Technology Description

Clarifiers

The raw influent is transferred to two Clarifiers (TK-1055A and TK-1055B) operating in parallel. Each clarifier is designed to be able to accept simultaneous flow from all of the sixteen truck offloading stations if required (i.e., if one clarifier is out of service), but normally, flow will be split equally between the two clarifiers. Each clarifier will have the capability for solids and oil removal. Solids from the Clarifiers (TK-1055A and TK-1055B) will be pumped to the Sludge Holding Tank (TK-2020). Oil that is removed from the Clarifiers (TK-1055A and TK-1055B) will be pumped to the Oil Collection Tank (TK-1065). Water will flow from the Clarifiers (TK-1055A and TK-1055B) into the small Clarifier Pump Tanks (TK-1060A and TK-

1060B) before being pumped to a larger Equalization Tank (TK-1070). The Clarifiers (TK-1055A and TK-1055B) and the Clarifier Pump Tanks (TK-1060A and TK-1060B) will all be covered and vented, with all off-gas being routed to a Thermal Oxidizer (U-1080).

Equalization Tank

Water will be pumped from the Clarifier Pump Tanks (TK-1060A and TK-1060B) to an Equalization Tank (TK-1070). The Equalization Tank (TK-1070) will include an oil removal device. Oil that is removed from the tank will also be pumped to the Oil Collection Tank (TK-1065). The Clarifier Pump Tanks (TK-1060A and TK-1060B) and Equalization Tank (TK-1070) will be covered and vented, with all off-gas being routed to the Thermal Oxidizer (U-1080).

Oil Collection Tank

Oil from the Clarifiers (TK-1055A and TK-1055B) and the Equalization Tank (TK-1070) is pumped to an Oil Collection Tank (TK-1065) and then trucked offsite. The Oil Collection Tank (TK-1065) will be covered and vented, with all off-gas being routed to the Thermal Oxidizer (U-1080).

Solids Contact Clarifier

The water is pumped from the Equalization Tank (TK-1070) and enters the Solids Clarifier Tank (TK-2010) where select constituents are chemically removed. Select constituent removal aids in both incremental water treatment, as well as protection and optimal water chemistry for the thermal system's equipment and process.

The solids generated during pretreatment are removed from the Solids Clarifier Tank (TK-2010) and pumped to the Sludge Holding Tank (TK-2020). The clarified effluent from the Solids Clarifier Tank (TK-2010) will flow into an Effluent Tank (TK-2015). All of the tanks in this process are covered and vented with all off-gas routed for emissions control by the Thermal Oxidizer (U-1080).

Pre-Treatment Dewatering System

The volumetric feed to the Sludge Holding Tank (TK-2020) will consist of sludge from the Solids Clarifier Tank (TK-2010) and sludge from the Clarifiers (TK-1055A and TK-1055B). The sludge is continuously pumped from the Sludge Holding Tank (TK-2020) to Dewatering Equipment. Recovered filtrate from dewatering equipment is then sent to the Sludge Filtrate Tank (TK-2030) for temporary storage before it is recycled to the Clarifiers (TK-1055A and TK-1055B) to be retreated. The dewatered cake will be transferred for transport to a landfill (DISP1). The dewatering equipment will also be operated 24 hours per day, 7 days per week.

Thermal Feed Tank

Effluent from the Solids Clarifier Tank (TK-2010) will flow into a small Clarifier Effluent Tank (TK-2015) and will then be pumped to the Thermal Feed Tank (TK-2040). The Thermal Feed Tank (TK-2040) will be covered and vented, with all off-gas being routed to a Thermal Oxidizer (U-1080). An off-spec line will also be added so that the water can be recycled back to the front of the pre-treatment system in the event that it is not acceptable as feed to the thermal system.

Thermal Process System
Thermal Feed brine is pumped from the Thermal Feed Tank (TK-2040) into the thermal system. Steam from two (2) natural gas-fired boilers (H-2185A and H-2185B) provides the energy to drive the thermal process. Chemicals are added to the boilers via the Boiler Chemical Treatment A and B (U-4105 and U-4110) to optimize boiler performance. A small amount of steam is passed through the Deaerator (E-2076) counter-current to the feed brine. The vent from the Deaerator (E-2076) will include components such as ammonia and volatile organics which are sent to the thermal oxidizer (U-1080). Deaerator brine from the Deaerator is temporarily stored in the Process Distillate Level Tank (TK-2120).

Slurry from the thermal process is pumped to the dewatering building where solids are removed for disposal. Centrate from the dewatering process is returned to the thermal process after temporary storage in the Disposal Centrate Tank (TK-2160). The Disposal Centrate Tank (TK-2160) is controlled by the thermal oxidizer (U-1080).

The vast majority of the water that enters the system leaves as clean, recovered distillate. Most often, this distillate is planned to be reused in future oil and gas operations. If distillate production exceeds the need for recycled fracing water, the balance of the distillate stream may be discharged to a surface water source, but only if the chemical makeup of that distillate complies with strict water quality standards designated by appropriate government permits. This water treatment facility has been designed to meet those anticipated discharge water quality requirements.

Cooling water is required for various uses. Plant service water is used as make-up water to the cooling tower (CT-2335); this water is treated distillate, so it is of high quality. Blowdown from the tower will be released based on cooling water conductivity.

A cooling tower treatment package is included to satisfy regulatory requirements associated with the operation of the tower. One or more biocides will be added to control biological activity and to control health risks.

Post-Treatment
From the Thermal System, distillate will flow to the Recovered Water Tank (TK-2140), which will be covered and vented with all off-gas being routed to the Thermal Oxidizer (U-1080). Distillate will then flow to Post Treatment Tank 1 (TK-2500) followed by Post Treatment Tanks 2 and 3 (TK-2550 and TK2555). This is where the distillate will be post-treated for reduction of ammonia and benzene in order to achieve a water quality that is suitable for discharge to the environment. The treated water will then flow into the Post Treatment Effluent Tank (TK-2515), through one final post treatment process, and finally to the Product Water Storage Tank (TK-2545) before leaving site as qualifying effluent. Any sludge generated in the post treatment process will be sent to the Post Treatment Sludge Tank (TK2520) and ultimately the same dewatering system as the pretreatment sludge by being returned to the TK-1055 A/B in the pretreatment process.

Chemical Storage

Throughout the process flow, a number of chemicals will be stored and pumped throughout the site to assist in water treatment. These chemical material safety data sheets have been included in Attachment H of the permit application. The following table is a reference to all of the small storage bins and tanks that hold these chemicals. Some of these storage vessels hold inorganic materials or solids therefore have no resulting emissions. Please see the Emissions Summary in Attachment N for a full explanation for each vessel.

Sodium Bisulfite Tote (TK-4080)	Dewatering Polymer System Aging Tank (TK-4165)	Hydrogen Peroxide Tote (TK-4025)
Sodium Sulfate Day Tank (TK-4039)	Sodium Bicarbonate Day Tank (TK-4014)	Polymer Totes (TK-4054, TK-4120, TK-4015, TK-4155 and TK-4057)
Urea Tote (TK-4065)	Post Treatment Polymer System Aging Tank (TK-4170)	CO_2 Feeder System (U-4075)
Lime Slurry Premix Tanks A&B (TK-4049A/B)	Ferric Chloride Storage Tank (TK-4000)	Phosphoric Acid Tote (TK-4125)
Clarifier Polymer Aging Tank (TK-4175)	Caustic Bulk Storage Tank (TK-4020)	Micronutrient Tote (TK-4150)
Lime Slurry Tanks A&B (TK-4049A/B)	Methanol Bulk Storage Tank (TK-4115)	Hydrex 2126 Tote (TK-4190)
Solids Clarifier Polymer System Aging Tank (TK-4160)	Sulfuric Acid Bulk Storage Tank (TK-4180)	Sodium Hypochlorite Tote (TK-4185)
Sodium Bicarbonate Bin Feeder (U-4013)		

SITE INSPECTION

A site inspection was conducted on August 26, 2015 by the writer, Dennis Stottlemyer (DEP Environmental Advocate Office), Jeremy Bandy (DEP Environmental Enforcement (EE)), Larry Board (DEP DWWM), Jon Bosley (DWWM), Jason Ely (DEP EE), and James Tallman (DEP EE). The closest residence is approximately 900 feet from the proposed facility. No construction had occurred.

Latitude: 39.26922
Longitude: -80.89310

Directions to the facility are as follows:

From Greenwood: Facility located off of US-50 on access road off of Gum Run Road (50/36)

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions associated with this application consist of the combustion emissions from one (1) diesel-fired emergency generator (1E), two (2) natural gas-fired boilers (2E, 3E), one (1) thermal oxidizer (4E), multiple tanks controlled by a thermal oxidizer and fugitive emissions. Fugitive emissions from the facility are negligible due to the fact that most processes are in the liquid phase or are less than 1% VOC. Once the process moves to the vapor phase, the volatiles and oils have been removed, are adsorbed by the solids or otherwise consumed in the process. The following table indicates which methodology was used in the emissions determination:

Emission Point ID#	Process Equipment	Calculation Methodology
1E	1,194 HP Diesel-Fired Emergency Generator	Manufacturer's Data, EPA AP-42 Emission Factors
2E	276.5 MMBTU/hr NG-Fired Boiler	Manufacturer's Data, EPA AP-42 Emission Factors
3E	276.5 MMBTU/hr NG-Fired Boiler	Manufacturer's Data, EPA AP-42 Emission Factors
4E	Thermal Oxidizer	EPA AP-42 Emission Factors
TL	Truck Unloading Influent Water	EPA AP-42 Emission Factors
28E	Cooling Tower	EPA AP-42 Emission Factors
Waste Gas Header (4E)	TK-1055A/B, TK-1060A/B, TK-1070, TK-2010, TK-2015, TK-2040, TK-1065, TK-2020, TK-2030, TK-2160, E-2076, TK-2130, TK-2140	WATER9, TANKS 4.09d, Material Balance
Post Treatment System	TK-2500, TK-2550, TK-2555, CF-2510, TK-2520, TK-2515	Material Balance, WATER9
Sludge and Wetcake Disposal	DISP1, DISP2	Material Balance, EPA Emission Factors
Storage Tank W&B Losses	TK-2120, TK-4115, TK-4180	EPA Tanks 4.09d
Sodium Sulfate Feeder	TK-4036, U-4037, U-4038	EPA AP-42 Emission Factors
Bulk Lime Feeder A	TK-4046A, U-4047A, U-4048A	EPA AP-42 Emission Factors
Bulk Lime Feeder B	TK-4046B, U-4047B, U-4048B	EPA AP-42 Emission Factors
Sodium Bicarbonat e Feeder	TK-4011, U-4012, U-4013	EPA AP-42 Emission Factors
Fugitive Dust	Vehicle Travel on Facility Roads	EPA AP-42 Emission Factors

The total facility PTE for the Sandstrom Facility is shown in the following table:

Pollutant	**R13-3260 PTE (tons/year)**
Nitrogen Oxides	94.86
Carbon Monoxide	95.41
Volatile Organic Compounds	66.54
Particulate Matter-10	35.17
Particulate Matter-2.5	29.07
Sulfur Dioxide	1.82
Total HAPs	3.91
Carbon Dioxide Equivalent	301,969

Maximum detailed controlled point source emissions were calculated by Antero and checked for accuracy by the writer and are summarized in the table on the next page.

Antero Resources Corporation – Sandstrom Water Treatment Facility (R13-3260)

Emission Point ID#	Source	NO_x		CO		VOC		PM-10		SO_2		Formaldehyde		Total HAPs		CO2e
		lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	lb/hr	ton/year	ton/year
1E	Emergency Generator	12.64	3.16	6.84	1.71	<0.01	<0.01	0.40	0.10	0.10	0.02	<0.01	<0.01	0.01	<0.01	326
2E	Boiler	9.95	43.60	10.23	44.81	1.88	8.22	2.59	11.36	0.20	0.90	0.02	0.07	0.41	1.78	142160
3E	Boiler	9.95	43.60	10.23	44.81	1.88	8.22	2.59	11.36	0.20	0.90	0.02	0.07	0.41	1.78	142160
4E	Thermal Oxidizer (Controlled Tanks)	1.08	4.50	0.93	4.08	2.21	3.60	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.04	1825
TUL	Truck Unloading	0.00	0.00	0.00	0.00	18.59	16.86	0.00	0.00	0.00	0.00	<0.01	<0.01	0.12	0.11	15015
28E	Cooling Tower	0.00	0.00	0.00	0.00	0.00	0.00	0.94	4.12	0.00	0.00	0.00	0.00	0.00	0.00	0
TKS	Process Tanks	0.00	0.00	0.00	0.00	1.97	7.90	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	483
TKS	Storage Tanks	0.00	0.00	0.00	0.00	0.04	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.14	0
Total Point Source		**33.62**	**94.86**	**28.23**	**95.41**	**26.57**	**44.94**	**6.52**	**26.94**	**0.51**	**1.82**	**0.04**	**0.14**	**1.02**	**3.90**	**301969**
FUG	Sludge and Wetcake Disposal	0.00	0.00	0.00	0.00	4.93	21.60	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	0.02	0
FUG	Bulk Transfer Points	0.00	0.00	0.00	0.00	0.00	0.00	1.67	3.06	0.00	0.00	0.00	0.00	0.00	0.00	0
FUG	Fugitive Dust Emissions	0.00	0.00	0.00	0.00	0.00	0.00	1.32	5.17	0.00	0.00	0.00	0.00	0.00	0.00	0
Total Fugitive		**0.00**	**0.00**	**0.00**	**0.00**	**4.93**	**21.60**	**2.99**	**8.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0**
Total Sitewide		**33.62**	**94.86**	**28.24**	**95.41**	**31.50**	**66.54**	**9.51**	**35.17**	**0.51**	**1.82**	**0.04**	**0.14**	**1.03**	**3.91**	**301969**

REGULATORY APPLICABILITY

The following rules apply to the facility:

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

Antero would be subject to the opacity requirements in 45CSR2, which is 10% opacity based on a six minute block average. Antero would also be subject to the weight emission standard for particulate matter under 45CSR2. According to 45CSR2 Section 4.1.b, for Type 'b' fuel burning units, the product of 0.09 and the total design heat inputs for such units in million B.T.U.'s per hour. Therefore, each 276.5 MMBTU/hr natural gas fired boiler (2E, 3E), could not exceed 24.89 lb/hr of particulate matter. Each boiler (2E, 3E) has particulate matter emissions of 2.59 lb/hr. Therefore, Antero will meet this rule.

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.

Antero has one (1) thermal oxidizer at the facility. The thermal oxidizer is subject to section 4, emission standards for incinerators. The thermal oxidizer has negligible hourly particulate matter emissions. Therefore, the facility's thermal oxidizer should demonstrate compliance with this section. The facility will demonstrate compliance by maintaining records of the amount of natural gas consumed by the thermal oxidizer and the hours of operation. The facility will also monitor the flame of the thermal oxidizer and record any malfunctions that may cause no flame to be present during operation.

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

Antero will meet the weight emission standard for sulfur dioxide set forth in 45CSR10 which is 3.1 lb/MMBtu. For each 276.5 MMBTU/hr natural gas fired boiler (2E, 3E), the weight emission standard for a Type 'b' fuel burning unit would be 857.15 lb/hr for the natural gas fired boilers. The hourly sulfur dioxide rate set forth in Permit Application R13-3260 is 0.20 lb/hr for each natural gas fired boiler. Therefore, Antero will meet this rule. Antero will demonstrate compliance with this requirement by monitoring the amount of natural gas consumed by the boilers.

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)

A 45CSR13 construction permit applies to this source due to the fact that Antero exceeds the regulatory emission threshold for criteria pollutants of 6 lbs/hr and 10 tons/year of a regulated air pollutant and are subject to a substantive requirement of an emission control rule (40CFR60 Subpars Db and IIII).

Antero paid the appropriate application fee and published the required legal advertisement for a construction permit application.

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

45CSR16 applies to this source by reference of 40CFR60, Subparts Db and IIII. These requirements are discussed under those rules below.

45CSR30 (Requirements for Operating Permits)

The source is a nonmajor source subject to 45CSR30. This facility is a deferred Title V source.

45CSR40 (Control of Ozone Season Nitrogen Oxide Emissions)

This rule establishes general provisions for nitrogen oxide emissions from various emission units. The two (2) 276.5 MMBTU/hr boilers (2E, 3E) are subject to continuous emission monitoring (CEM) requirements as part of this rule.

40CFR60 Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units)

This rule applies to steam generating units with a heat input capacity greater than 100 MMBTU/hr for which construction commenced after June 19, 1984. The 276.5 MMBTU/hr boilers (2E, 3E) that Antero proposes to install will be subject to this rule. These units are subject to the New Source Performance Standards of Subpart Db since each unit will have a design heat input rating of greater than 100 MMBtu/hr. 40CFR60 Subpart Db establishes performance standards by pollutant by fuel type (i.e. coal, oil, and natural gas). For natural gas fired units, the subpart only establishes a performance standard for NO_x emissions. These units will be constructed after July 9, 1997 which makes the unit applicable to the limit in 40 CFR §60.44b(l) of 0.20 lb of NOx (expressed as NO_2) per MMBtu. These units will be equipped with a low-NOx burner with a maximum NOx rate of 0.036 lb/MMBtu. At this NO_x rating, these units would have a margin of compliance of 18% of the applicable NO_x limit.

Subpart Db requires affected sources to demonstrate compliance with the NO_x limit on a 30 day rolling average. This subpart will require the use of a NO_x continuous emission monitoring system (NO_x CEMS) with a means to measure either O_2 or CO_2 in the exhaust for demonstrating compliance with the NO_x emission standard.

40CFR60 Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE))

Subpart IIII sets forth non-methane hydrocarbon (NMHC), hydrocarbon (HC), nitrogen oxides (NO_x), carbon monoxide (CO), and particulate matter (PM) emission limits, fuel requirements, installation requirements, and monitoring requirements based on the year of installation of the subject internal combustion engine. The 1,194HP (890 kW) diesel fired generator (1E) is subject to this subpart. This unit is required to meet the Tier 2 standards of 6.3 g/kw-hr for NMHC+NO_x and 3.5 g/kw-hr for CO. Antero states this unit is an EPA certified engine. Antero will be required to possess an EPA Certificate of

Conformity for this engine prior to operation, or the engine will be subject to performance testing.

40CFR63 Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines)

Subpart ZZZZ establishes national emission limitations and operating limitations for HAPs emitted from stationary RICE located at major and area sources of HAP emissions. This subpart also establishes requirements to demonstrate initial and continuous compliance with the emission limitations and operating limitations. The generator (1E) at the Sandstrom Facility is subject to the area source requirements for non-emergency compression ignition engines.

The applicability requirements for new stationary RICEs located at an area source of HAPs, is the requirement to meet the standards of 40CFR60 Subpart IIII. These requirements were outlined above. The proposed engines meet these standards.

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)

The Sandstrom Facility is located in Doddridge County, which is an unclassified county for all criteria pollutants, therefore it is not applicable to 45CSR19.

As shown in the following table, Antero is not a major source subject to 45CSR14 or 45CSR19 review. According to 45CSR14 Section 2.43.e, fugitive emissions are included in the major source determination because it is listed as one of the source categories in Table 1 (fossil fuel boilers (or combination thereof) totaling more than 250 MMBTU/hr heat input).

Pollutant	**PSD (45CSR14) Threshold (tpy)**	**NANSR (45CSR19) Threshold (tpy)**	**Sandstrom Facility PTE (tpy)**	**45CSR14 or 45CSR19 Review Required?**
Carbon Monoxide	100	NA	95.41	No
Nitrogen Oxides	100	NA	94.86	No
Sulfur Dioxide	100	NA	1.82	No
Particulate Matter-10	100	NA	35.17	No
Ozone (VOC)	100	NA	66.54	No

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

The affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) (19,813 gallons) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. This subpart does not apply to storage vessels with a capacity greater than or equal to 151 m^3 storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa. This subpart also does not apply to pressure vessels designed to operate in excess of 204.9 kPa and without emissions to the atmosphere.

The following storage vessels that Antero has proposed have a maximum capacity less than 75 m^3 and/or do not contain a volatile liquid and are therefore exempt from this Subpart:

Oil collection tank (TK-1065)	Clarifier effluent tank (TK-2015)	Sludge filtrate tank (TK-2030)
CIP tank (TK-2320)	Process distillate level tank (TK-2120)	Steam condensate level tank (TK-2085)
Disposal centrate tank (TK-2160)	Boiler deaerator tank (TK-2315)	Brine maker tank (TK-2150)
Post Treatment effluent tank (TK-2515)	Post Treatment sludge tank (TK-2520)	Clarifer polymer aging tank (TK-4175)
Sodium sulfate day tank (TK-4039)	Lime slurry premix tank A and B (TK-4049A and TK-4049B)	Lime slurry tank A and B (TK-4049A and TK-4049B)
Dewatering polymer system aging tank (TK-4165)	Sodium bicarbonate day tank (TK-4014)	Post Treatment polymer system aging tank (TK-4170)
Ferric chloride storage tank (TK-4000)	Caustic bulk storage tank (TK-4020)	Methanol bulk storage tank (TK-4115)
Sulfuric acid bulk storage tank (TK-4180)	Solids Clarifier Polymer System Aging Tank (TK-4160)	All totes (TK-4025, 4080, 4054, 4057, 4120, 4155, 4015, 4125, 4150, 4065, 4185, 4190)

The Clarifier Pump Tanks A & B (TK-1060A and TK-1060B) each have a capacity between 75 m^3 and 151 m^3 with a vapor pressure less than 15 kPa (2.18 psia) and are therefore exempt from this Subpart.

The following tanks have a maximum storage capacity greater than 151 m^3 and are exempt from this Subpart since their vapor pressure will be less than 3.5 kPa.

Clarifier Tanks A & B (TK-1055A & TK-1055B)	Equalization Tank (TK-1070)	Thermal Feed Tank (TK-2040)
Sludge Holding Tank (TK-2020)	Boiler Feedwater Tank (TK-2180)	Recovered Water Tank (TK-2140)
Post Treatment Tank 1 (TK-2500)	Post Treatment Tank 2 (TK-2550)	Post Treatment Tank 3 (TK-2555)
Product Water Storage Tank (TK-2545)	Barometric Condenser Hotwell Tank (TK-2130)	Solids Clarifier Tank (TK-2010)
Post Treatment System Tanks (CF-2510)		

As shown in the regulatory analysis above, 40 CFR60 Subpart Kb is not applicable to the storage vessels at Sandstrom Water Treatment Facility.

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

EPA published in the Federal Register new source performance standards (NSPS) and air toxics rules for the oil and gas sector on August 16, 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.

There are no affected sources located within the Sandstrom Facility.

40CFR60 Subpart QQQ (Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems)

This rule applies to facilities constructed, modified or reconstructed after May 4, 1987 that operate an oil-water separator at a petroleum refinery.

There are no affected sources located within the Sandstrom Facility.

40CFR63 Subpart DD (National Emission Standards for Hazardous Air Pollutants from Off-Site Waste and Recovery Operations)

This rule applies to certain provisions of wastewater treatment facilities that are a major source of HAPs. The Sandstrom Facility is not a major source of HAPs, therefore, this rule would not apply.

40CFR63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters)

This rule applies to boilers that are a major source of HAPs. The Sandstrom Facility is not a major source of HAPs, therefore, this rule would not apply.

40CFR63 Subpart JJJJJJ (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources)

This rule applies to boilers at major and area sources of HAP emissions. The boilers (2E, 3E) are located at an area source of HAPs. These boilers will be firing natural gas only. Therefore, they meet the exemption criteria in §63.11193, therefore, this rule would not apply.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The following HAPs are common to this industry. The following table lists each HAP's carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	Category B1 - Probable Human Carcinogen
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Ethylbenzene	VOC	No	Inadequate Data
Toluene	VOC	No	Inadequate Data
Xylenes	VOC	No	Inadequate Data
n-Hexane	VOC	No	Inadequate Data
Cumene	VOC	No	Inadequate Data
Methanol	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at *www.epa.gov/iris*.

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) or 45CSR19 (Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution which Cause or Contribute to Nonattainment) as shown in the table listed in the Regulatory Discussion section under 45CSR14/45CSR19.

SOURCE AGGREGATION

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of "Building, structure, facility, or installation" as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

The Sandstrom Facility shares the same SIC code as several other well pads owned by Antero in the area. Therefore, the potential classification of the Sandstrom Facility as one stationary source with any other facility depends on the determination if these stations are considered "contiguous or adjacent properties."

"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. 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; or having a common endpoint or border. The closest Antero property to the Sandstrom facility is 0.65 miles northeast of this facility. These properties are not contiguous or adjacent.

Because the facilities are not considered to be on contiguous or adjacent properties, the emissions from the Sandstrom Facility should not be aggregated with other facilities in determining major source or PSD status.

MONITORING OF OPERATIONS

Antero will be required to perform the following monitoring and recordkeeping:

- Monitor and record the hours of operation of the generator
- Opacity observations of the thermal oxidizer
- Quarterly AVO (audio, visual, olfactory) inspections
- Thermal oxidizer flame must be continuously monitored
- Liquids unloaded throughput
- Sludge disposal
- Wetcake disposal
- Maintain records of the hours of operation for all engines
- Boiler fuel combustion
- 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
- Maintain the corresponding records specified by the on-going monitoring requirements of and testing requirements of the permit
- Maintain a record of all potential to emit (PTE) HAP calculations for the entire facility.
- Maintain records of all applicable requirements of 40CFR60 Subparts Db and IIII
- The records shall be maintained on site or in a readily available off-site location maintained by Antero for a period of five (5) years

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that Antero meets all the requirements of applicable regulations. Therefore, impact on the surrounding area should be minimized and it is recommended that the Sandstrom Facility should be granted a 45CSR13 construction permit for their facility.

Jerry Williams, P.E.
Engineer

10-07-2015
Date