



September 8, 2016

VIA HAND DELIVERY

Mr. William F. Durham, Director
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

Re: Chesapeake Appalachia, L.L.C.
Kanawha Separation Plant (ID#: 039-00094)
Permit R13-0436F
Class II Administrative Update

Dear Mr. Durham:

Chesapeake Appalachia, L.L.C. (Chesapeake), a subsidiary of Chesapeake Energy Corporation, submits the enclosed application for a Class II Administrative Update for its Kanawha Separation Plant. Chesapeake requests an amendment to Permit R13-0436, condition 4.1.7 to update the sulfur removal system's adsorbent change out requirement from 12 months to 18 months. There will be no changes to the equipment, process flow, or emissions that are currently permitted. However, the supporting calculations submitted with the permit application that were the basis of permit limits in the current permit are included with this submittal for reference.

A check in the amount of \$300 for the Class II Administrative Update application fee is enclosed. The public notice for the proposed project will be published in *Charleston Gazette-Mail* on Friday, September 9, 2016. Chesapeake will forward the Affidavit of Publication to your attention once it is received from the publisher.

Please note that due to discussions with John Legg regarding this project and because he was the permit writer for the current permit, Chesapeake requests that he be

assigned to review the enclosed permit application. We would also appreciate the opportunity to review the draft permit before it is issued. Please send a copy of the draft permit to the Northern Division Air Permitting Group at northerndivisionairpermitting@chk.com. Should you have questions or require further information, please contact me at 304-353-5118 or by e-mail at northerndivisionairpermitting@chk.com.

Sincerely,

Chesapeake Energy Corporation



Melissa Hatfield-Atkinson, P.E.
Supervisor – Air Permitting, Northern Division

Enclosures (Original Application + Two digital copies)

CHESAPEAKE APPALACHIA, L.L.C.

KANAWHA SEPARATION PLANT

CLASS II ADMINISTRATIVE UPDATE

**SUBMITTED TO WVDEP DIVISION OF AIR QUALITY
September 2016**

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
INTRODUCTION	1
WVDEP APPLICATION FOR CLASS II AMENDMENT	3
ATTACHMENT A: BUSINESS REGISTRATION CERTIFICATE.....	9
ATTACHMENT B: MAP.....	NO CHANGE
ATTACHMENT C: INSTALLATION/START-UP SCHEDULE.....	NOT APPLICABLE
ATTACHMENT D: REGULATORY DISCUSSION	11
ATTACHMENT E: PLOT PLAN.....	NO CHANGE
ATTACHMENT F: PROCESS FLOW DIAGRAM	NO CHANGE
ATTACHMENT G: PROCESS DESCRIPTION	12
ATTACHMENT H: MATERIAL SAFETY DATA SHEETS (MSDS)	13
ATTACHMENT I: EMISSION UNITS TABLE.....	NO CHANGE
ATTACHMENT J: EMISSION POINTS DATA SUMMARY SHEET	NO CHANGE
ATTACHMENT K: FUGITIVE EMISSIONS DATA SUMMARY SHEET	NO CHANGE
ATTACHMENT L: EMISSION UNIT DATA SHEETS.....	NO CHANGE
ATTACHMENT N: SUPPORTING EMISSIONS CALCULATIONS	16
ATTACHMENT O: MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS.....	NO CHANGE
ATTACHMENT P: PUBLIC NOTICE	25

INTRODUCTION

The current permit for Chesapeake Appalachia, L.L.C.'s (Chesapeake's) Kanawha Separation Plant (KSP) states in Condition 4.1.7 that the Sulfatreat adsorbent that is part of a sulfur removal system utilized at the facility must be replaced every 12 months of operation. The sulfur removal system is actually owned and operated by Praxair, Inc. but is accounted for in Chesapeake's air permit.

Since the sulfur removal system was initially permitted, there have been significant improvements made to the process which means less gas is being flared in any kind of bypass operation and less emissions generated. When Chesapeake updated the permit in 2006 for KSP after an extensive testing campaign, the resulting SO₂ emissions that were the basis of permit limits were actually based on inlet gas concentration of sulfur at the maximum potential inlet flow with no credit for any kind of sulfur emissions reduction from the sulfur removal system being taken (which was discussed with and approved by WVDAQ).

In September 2015, Chesapeake requested on Praxair's behalf a onetime 30 day extension to the adsorbent change out schedule. This was approved by the WVDAQ as noted in the following response by your Office's Todd Shrewsbury:

"Per our telephone conversation this afternoon, it is the understanding of the Director of the West Virginia Division of Air Quality (Director) that a 30 day extension of the requirement to replace the hydrogen sulfide (H₂S) adsorbent in Chesapeake's Kanawha Separation Plant Sulfatreat vessel every 12 months of logged operations (condition 4.1.7 of permit R13-0436F) described below will result in no deviations of permitted atmospheric pollutant emission limits or odor emissions from the facility nor will it negatively affect the operations or safety of the facility. It also is the understanding of the Director that this requirement was based upon operation of the separation facility at the maximum permitted inlet raw gas flow rate of 650,000 standard cubic feet per hour, and that the facility currently can only operate at a fraction of the permitted inlet flow rate due to the declining supply field. It is the understanding of the Director that the H₂S concentrations in the raw inlet gas have not significantly increased since the issuance of R13-0436F, which would negatively impact the longevity of the Sulfatreat adsorbent. It is the understanding of the Director that this lesser inlet flow rate (at constant inlet H₂S concentrations) consumes the adsorbent in the Sulfatreat vessel at a slower rate than the permitted maximum inlet flow rate, providing for reserve capacity in the Sulfatreat system at the end of 12 months of logged operations. The Director is of the understanding that Chesapeake is considering and will likely act on Praxair's request to petition the Director to update permit R13-0436F to increase the adsorbent replacement rate from a maximum of 12 months of logged operations to a maximum of 18 months of logged operations."

At this time, Chesapeake is requesting an amendment to condition 4.1.7 to update the adsorbent change out requirement from 12 months to 18 months. Praxair has analytical equipment in place that continuously monitors impurities in the process at both KSP and their Marmet plant. If a trend developed indicating a decline in purity, the Praxair operators would recognize and report the issue to Chesapeake.

For these reasons and those noted above, Chesapeake is confident that the extension in the adsorbent change out schedule to 18 months will not cause a deviation in currently permitted SO₂ emissions, which Chesapeake intends to retain, as is, in the permit. The supporting calculations submitted with the permit application that were the basis of permit limits in the current permit are included with this submittal for reference. There will be no changes to the equipment, process flow, or emissions.

Please note, that the brand of adsorbent has been changed from Sulfratreat to Hydrocat. It is the same product, just a different brand name.

WVDEP APPLICATION FOR CLASS II PERMIT AMENDMENT



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
 Charleston, WV 25304
 (304) 926-0475
www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
 AND
 TITLE V PERMIT REVISION
 (OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

- CONSTRUCTION MODIFICATION RELOCATION
 CLASS I ADMINISTRATIVE UPDATE TEMPORARY
 CLASS II ADMINISTRATIVE UPDATE AFTER-THE-FACT

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

- ADMINISTRATIVE AMENDMENT MINOR MODIFICATION
 SIGNIFICANT MODIFICATION

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): Chesapeake Appalachia, L.L.C.		2. Federal Employer ID No. (FEIN): 20-3774650	
3. Name of facility (if different from above): Kanawha Separation Plant		4. The applicant is the: <input type="checkbox"/> OWNER <input type="checkbox"/> OPERATOR <input checked="" type="checkbox"/> BOTH	
5A. Applicant's mailing address: P.O. Box 18496 Oklahoma City, OK 73154-0496		5B. Facility's present physical address: 1544 Natural Resources Circle Tad, WV 25201	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A . – If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A .			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation: Chesapeake Energy Corporation			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the <i>proposed site</i> ? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO – If YES, please explain: Chesapeake owns the land on which the site is constructed. – If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): CO2 recovery and natural gas sweetening plant		10. North American Industry Classification System (NAICS) code for the facility: 211111	
11A. DAQ Plant ID No. (for existing facilities only): 039-00094		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): R13-0436F	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates or Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction or Relocation permits**, please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP as Attachment B.**

Take secondary Route 73 (Campbells Creek Drive), which is located off of US Route 60 a short distance east of the intersection of US Route 60 and Interstate 77. Continue on Campbell's Creek Drive for approximately 3 miles to Point Lick Road. Turn right onto Point Lick Road and travel approximately 3 miles to a "Y" intersection. Take the right fork to the next "Y" intersection, turn left and continue a short distance to the station.

12.B. New site address (if applicable):

N/A

12C. Nearest city or town:

Rensford

12D. County:

Kanawha

13E. UTM Northing (KM): **4239.02**

13F. UTM Easting (KM): **459.19**

13G. UTM Zone: **17**

13. Briefly describe the proposed change(s) at the facility: **Chesapeake is requesting an amendment to condition 4.1.7 to update the adsorbent change out requirement from 12 months to 18 months. Permitted emissions will remain unchanged.**

14A. Provide the date of anticipated installation or change: **Upon updated permit issuance**
 - If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /

14B. Date of anticipated Start-Up if a permit is granted:

N/A

14C. Provide a **Schedule** of the planned **Installation of/Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved). **NOT APPLICABLE**

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:

Facility: Hours Per Day **24** Days Per Week **7** Weeks Per Year **52**

16. Is demolition or physical renovation at an existing facility involved? **YES** **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (*if known*). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (*if known*). Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan**, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to **Plot Plan Guidance**) .

- Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

NOT APPLICABLE – NO CHANGE

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.** **NOT APPLICABLE – NO CHANGE**

23. Provide a **Process Description** as **Attachment G.**

- Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide Material Safety Data Sheets (MSDS) for all materials processed, used or produced as Attachment H . – For chemical processes, provide a MSDS for each compound emitted to the air.	
25. Fill out the Emission Units Table and provide it as Attachment I .	
26. Fill out	
27. Fill out	
28. Check <input type="checkbox"/> Bulk Li <input type="checkbox"/> Chemid <input type="checkbox"/> Concre <input type="checkbox"/> Grey Ir <input type="checkbox"/> Genera Fill out and	NOT APPLICABLE – NO CHANGE
29. Check	
<input type="checkbox"/> Absorp	
<input type="checkbox"/> Adsorp	
<input type="checkbox"/> Afterbu	
<input type="checkbox"/> Other C	
Fill out and provide the Air Pollution Control Device Sheet(s) as Attachment M .	
30. Provide all Supporting Emissions Calculations as Attachment N , or attach the calculations directly to the forms listed in Items 28 through 31.	
31. Monitoring, Recordkeeping, Reporting and Testing Plans. Attach proposed monitoring, recordkeeping, reporting and testing plans as Attachment O . ➤ Please provide a copy of the monitoring, recordkeeping, reporting and testing plans proposed by the applicant. If the applicant is unable to develop such plans, DAQ will develop such plans and include them in the permit.	NOT APPLICABLE – NO CHANGE
32. Public Notice. At the time that the application is submitted, place a Class I Legal Advertisement in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and Example Legal Advertisement for details). Please submit the Affidavit of Publication as Attachment P immediately upon receipt.	
33. Business Confidentiality Claims. Does this application include confidential information (per 45CSR31)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO ➤ If YES , identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR31-4.1, and in accordance with the DAQ's "Precautionary Notice – Claims of Confidentiality" guidance found in the General Instructions as Attachment Q .	

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application.
 Check applicable Authority Form below:

Authority Form 1
 Authority Form 2

NOT APPLICABLE

Submit completed and signed Authority Form as Attachment R.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned **Responsible Official** / **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: 02/16/16
(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: <u>Joe Ketzner</u>		35C. Title: <u>Vice President</u>
35D. E-mail: <u>joie.ketzner@chk.com</u>	36E. Phone: <u>405-935-8000</u>	36F. FAX: <u>405-849-2183</u>
36A. Printed name of contact person (if different from above): <u>Melissa Hatfield Atkinson, P.E.</u>		36B. Title: <u>Supervisor – Air Permitting, Northern Division</u>
36C. E-mail: <u>northerndivisionairpermitting@chk.com</u>	36D. Phone: <u>304-353-5118</u>	36E. FAX: <u>304-353-5231</u>

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate | <input type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet |
| <input type="checkbox"/> Attachment B: Map(s) | <input type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) |
| <input type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations |
| <input type="checkbox"/> Attachment E: Plot Plan | <input checked="" type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) | <input checked="" type="checkbox"/> Attachment P: Public Notice |
| <input checked="" type="checkbox"/> Attachment G: Process Description | <input type="checkbox"/> Attachment Q: Business Confidential Claims |
| <input checked="" type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input type="checkbox"/> Attachment R: Authority Forms |
| <input type="checkbox"/> Attachment I: Emission Units Table | <input type="checkbox"/> Attachment S: Title V Permit Revision Information |
| <input type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Application Fee |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- Forward 1 copy of the application to the Title V Permitting Group and:*
- For Title V Administrative Amendments:*
 - NSR permit writer should notify Title V permit writer of draft permit,*
- For Title V Minor Modifications:*
 - Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,*
 - NSR permit writer should notify Title V permit writer of draft permit.*
- For Title V Significant Modifications processed in parallel with NSR Permit revision:*
 - NSR permit writer should notify a Title V permit writer of draft permit,*
 - Public notice should reference both 45CSR13 and Title V permits,*
 - EPA has 45 day review period of a draft permit.*

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A: BUSINESS REGISTRATION CERTIFICATE

**WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:
**CHESAPEAKE APPALACHIA L L C
6100 N WESTERN AVE
OKLAHOMA CITY, OK 73118-1044**

BUSINESS REGISTRATION ACCOUNT NUMBER: 1010-8420

This certificate is issued on: **06/27/2011**

*This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued.

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

**TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of
this certificate displayed at every job site within West Virginia.**

atL006 v.4
L0791837824

ATTACHMENT D: REGULATORY DISCUSSION

With this proposed permit amendment, there will be no changes to applicable regulations as outlined in previous application submittals.

ATTACHMENT G: PROCESS DESCRIPTION

Kanawha Separation Plant is used to recover CO₂ and pipeline quality natural gas from gas wells that are located near the plant. In September 1999, permit approval was issued for the installation of a sulfur removal system at the plant that is operated by Praxair, Inc. The sulfur removal system was installed in order to remove TRS from the recovered CO₂ stream before shipment to the off-site CO₂ purification plant, owned and operated by Praxair. The Hydrocat (formerly Sulfatreat) vessel is utilized to remove virtually all the H₂S in the recovered CO₂ stream and ~30% of the mercaptans. The H₂S and mercaptan compounds are entrained in the adsorbent material. After the stream flows through the Hydrocat vessel, it then flows through the carbon adsorbent vessel which removes the remaining TRS compounds. The TRS compounds are not entrained in the adsorbent material and are present in the regeneration stream of the carbon adsorbent vessel that is sent to the flare, along with the Selexol tail gas stream. Since there are 2 beds that make up the carbon adsorbent system, and one bed is regenerated while the other is being used.

Since the sulfur removal system was initially permitted, there have been significant improvements made to the process which means less gas is being flared in any kind of bypass operation and less emissions generated. In addition, the maximum inlet flow to the facility that was the basis of potential to emit calculations in the current permit has dropped significantly due to a decline in the field.

ATTACHMENT H: MATERIAL SAFETY DATA SHEETS (MSDS)

MATERIAL SAFETY DATA SHEET

I - IDENTIFICATION			
CHEMICAL NAME HydroCat - G1001	CHEMICAL FORMULA Mixed Iron Oxides on Natural Substrate	MOLECULAR WEIGHT N/A	
MANUFACTURER'S NAME HydroCat Industries		ADDRESS 1734 Clarkson Road, #208, Chesterfield, MO 63017, USA	
EMERGENCY AND INFORMATION NUMBER (636) 536 - 2416	DOT IDENTIFICATION NO. None	HMIS RATING Health - 1, Flammability - 0, Reactivity - 0, Personal Protection - E	
II - PRODUCT AND COMPONENT DATA			
COMPONENT(S) CHEMICAL NAME PROPRIETARY	CAS REGISTRY NO. N/A	% (Approx)	ACGIH TLV-TWA See Section VI
III - PHYSICAL DATA			
APPEARANCE AND ODOR Odorless Red/Black Granular Solid	SPECIFIC GRAVITY @ 60°F (H ₂ O = 1) Approximately 1.1 g/cc		
BOILING POINT N/A	VAPOR DENSITY IN AIR (Air - 1) N/A		
VAPOR PRESSURE N/A	% VOLATILE, BY VOLUME N/A		
EVAPORATION RATE N/A	SOLUBILITY IN WATER Insoluble		
IV - REACTIVITY DATA			
STABILITY Stable	CONDITIONS TO AVOID Contact with powerful oxidizers such as strong acids.		
INCOMPATIBILITY (Materials to avoid)	Powerful oxidizers such as strong acids and strong oxidizers.		
HAZARDOUS DECOMPOSITION PRODUCTS	None Known		
HAZARDOUS POLYMERIZATION	Will Not occur		
V - FIRE AND EXPLOSION HAZARD DATA			
FLASH POINT (Method used) N/A	FLAMMABLE LIMITS IN AIR Not Flammable		
EXTINGUISHING AGENTS Water spray, dry chemicals, sand, or universal type foam, or use extinguishing agent most suitable for type of surrounding fire.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Dust can present fire and explosion hazards when exposed to fire, chemical reaction, or contact with powerful oxidizers.			
VI - TOXICITY AND FIRST AID			
EXPOSURE LIMITS - 8-Hour Time Weighted Average (When exposed to this product and other chemicals is concurrent, the TLV must be defined in the workplace.)			
Metal Oxide	OSHA 5mg/m ³	ACGIH 10mg/m ³	
Effects described in this section are believed not to occur if exposures are maintained at or below appropriate TLVs. Because of the wide variation in individual susceptibility, TLVs may not be applicable to all persons and those with medical conditions listed below.			
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Inhaling respirable dust may aggravate existing respiratory system disease(s) and/or dysfunctions. Exposure to dust may aggravate existing skin and/or eye conditions.			
ACUTE TOXICITY	Primary route(s) of exposure: <input type="checkbox"/> Inhalation <input type="checkbox"/> Ingestion		
Exposure to dust may irritate respiratory system, eyes, and skin.			
FIRST AID <u>Dust in eyes:</u> Flush eyes with running water for 15 minutes. Contact a physician if irritation persists. <u>Dust on skin:</u> Wash with soap and water. Contact a physician if a previously existing irritation is aggravated. <u>Dust inhalation:</u> Remove to fresh air. Dust in throat and nasal passages should clear spontaneously. Contact a physician if irritation persists.			

CHRONIC TOXICITY

Chronic exposure to respirable dust in excess of appropriate TLVs has caused pneumoconiosis (Dusty Lung).

To the best of our knowledge this product is not listed as a carcinogen on the NTP, IARC, or OSHA lists of carcinogens or contains no levels of listed substances, which the state of California has found to cause cancer, birth defects, or other reproductive effects.

VII – PERSONAL PROTECTION AND CONTROLS**RESPIRATORY PROTECTION**

NIOSH-MSHA approved dust respirators for conditions where dust levels exceed or are likely to exceed appropriate exposure limits. Respirator use must comply with applicable MSHA or OSHA standards, which include provisions for a user training program, respirator repair and cleaning, respirator fit testing, and other requirements.

VENTILATION

Local exhaust or general ventilation adequate to maintain exposures below appropriate TLVs.

SKIN PROTECTION

See "Hygiene" section below. Not absorbed through skin.

EYE PROTECTION

Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively (visible) dusty conditions are present or are anticipated.

HYGIENE

Wash dust-exposed skin with soap and water. Wash work clothes after each use.

OTHER CONTROL MEASURES

Use good housekeeping practices to keep dust to a minimum. Dust levels in excess of appropriate TLVs should be reduced by all feasible engineering controls, including (but not limited to) wet suppression, ventilation, process enclosure, and enclosed employee work stations.

VIII – STORAGE AND HANDLING PRECAUTIONS

Product should be stored at ambient temperature in closed containers avoiding exposure to excessive moisture. Respirable dust may be generated during processing, handling, and storage. The controls identified in Section VII of the MSDS should be applied as appropriate.

IX – SPILL LEAK AND DISPOSAL PRACTICES**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Spilled materials, where dust can be generated, may overexpose cleanup personnel to respirable dust. Wetting of spilled material and/or use of respiratory protective equipment may be necessary.

WASTE DISPOSAL METHOD

Pickup and reuse clean materials. Dispose of waste materials only in accordance with applicable federal, state, and local laws and regulations.

X - TRANSPORTATION

DOT HAZARD CLASSIFICATION None – Ship as Class 50

PLACARD REQUIRED None

LABEL REQUIRED Label as required by applicable state and local regulations.

XI - REGULATORY INFORMATION

DISPOSAL: This product is not hazardous waste per 40 CFR 261.24 or 261.3. However consult with the state environmental regulatory agency before disposing of this material, as state regulations may be stricter than federal regulations.

SPILL REPORTING This product is not a CERCLA hazardous substance, per 40 CFR 302.4. It contains nothing on the list of hazardous substances under the Clean Water Act (40 CFR 116 and 40 CFR 117), nor are they included on the list of Extremely Hazardous Substances under SARA, 40 CFR 355 Appendix A. Thus, there are no Federal reporting requirements in the event of release of this material.

SARA REPORTING: This product is not subject to the reporting requirements of Section 304 of SARA, since it contains nothing on the list of Extremely Hazardous Substances. In addition, This product is not subject to the reporting requirements of Section 313 of SARA.

CALIFORNIA PROPOSITION 65 - To the best of our knowledge this product contains no levels of listed substances, which the state of California has found to cause cancer, birth defects, or other reproductive effects.

CARCINOGENIC - To the best of our knowledge this product is not listed as a carcinogen on the NTP, IARC, or OSHA lists of carcinogens.

DATE OF PREPARATION: April 3, 2008

NOTICE: HydroCat Industries believes that the information contained on this Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all-inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with nor followed in notation of applicable laws, regulations, rules or insurance requirements.

NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE IS MADE.

MSDS HC – G1001

ATTACHMENT N: SUPPORTING EMISSIONS CALCULATIONS

**A COPY OF THE EMISSIONS CALCULATIONS PROVIDED IN THE MOST
RECENT PREVIOUS PERMIT UPDATE REQUEST FILED IN 2006 IS
ATTACHED.**

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

Discussion:

The method of calculating SO₂ emissions was revised. Instead of calculating the SO₂ emissions based on the sulfur contents of individual streams added together, a mass balance was performed by using the maximum inlet gas sulfur content and the maximum potential inlet gas flow rate.

Inlet sulfur content: 8.62 gr/100 cf
Max. inlet gas flow rate: 650,000 scf/hr

SO₂ Emissions =

$$\begin{aligned} & (\text{gr S} / 100 \text{ cf}) * (\text{max. inlet gas flow rate}) * (1 \text{ lb} / 7000 \text{ gr}) * (64 \text{ lbs SO}_2 / 32 \text{ lbs S}) = \\ & (8.62 \text{ gr S} / 100 \text{ cf}) * (650,000 \text{ cf/hr}) * (1 \text{ lb} / 7000 \text{ gr}) * (64 \text{ lb SO}_2 / 32 \text{ lb S}) = \\ & = 16.01 \text{ lb/hr} \end{aligned}$$

This result occurred during the “grab sample” testing that was performed in December 2004 and is significantly higher than any of the results obtained during the two on-site testing campaigns. Therefore, since the emissions are calculated solely using the maximum inlet gas concentration and flow rate without taking any credit for Sulfur emissions reduction, then the resulting limit is appropriate.

The other criteria pollutant’s emissions were calculated using the same methodology described in the previous permit application. However the following updates were made:

1. The maximum VOC concentrations of the individual streams were used out of all the test data and increased 25% to account for variability factors.
2. The highest BTU contents of the individual streams were used to yield conservatively higher emissions results.
3. The number of hours at maximum flow rates that were used in calculations for normal, partial, and bypass modes were adjusted.
4. The flare’s efficiency was reduced from 98% to 95%.

The attachment illustrates the methodology used for the emissions calculations for the other criteria pollutants.

TYPICAL OPERATION EMISSIONS

Flow in lb/hr =

Flow [scfh] * Density [lb/scf]

EX.) For carbon bed regeneration flow: 45000 scf/hr * 0.114 lb/scf = 5130 lb/hr

Natural gas requirement to achieve 200 Btu/scf LHV =

$$\frac{200 \text{ Btu/scf} * \text{Total flow (excluding nat.gas) [scf/hr]} - \text{Sum of each ind. Flow [scfh]} * \text{its LHV [btu/scf]}}{\text{LHV natural gas [scfh]} - 200 \text{ Btu/scf}}$$

$$\frac{200 \text{ Btu/scf} * (45000 \text{ scf/hr} + 30000 \text{ scf/hr}) - [(45000 \text{ scf/hr} * 81 \text{ Btu/scf}) + (30000 \text{ scf/hr} * 42 \text{ Btu/scf})]}{(920 \text{ Btu/scf} - 200 \text{ Btu/scf})}$$

$$= \frac{15000000 \text{ Btu/hr} - 4905000 \text{ Btu/hr}}{720 \text{ Btu/scf}} = 14021 \text{ scfh}$$

Total Waste gas =

Sum of all Flows [lb/hr], excluding natural gas

$$4995 \text{ lb/hr} + 3420 \text{ lb/hr} + 0 = 8415 \text{ lb/hr}$$

Total Heat input =

$$\frac{(\text{Sum of each ind. Flow [scfh]} * \text{its HHV [Btu/scf]} * 1 \text{ mmBtu}}{1000000 \text{ Btu}}$$

$$= \frac{[(45000 \text{ scf/hr} * 89 \text{ Btu/scf}) + (30000 \text{ scf/hr} * 93 \text{ Btu/scf}) + (25000 \text{ scf/hr} * 1020 \text{ Btu/scf})] * 1 \text{ mmBtu}}{1000000 \text{ Btu}}$$

$$= \frac{32295000 \text{ Btu/scf} * 1 \text{ mmBtu}}{1000000 \text{ Btu}} = 32.3 \text{ Mmbtu/hr}$$

Kanawha Separation Plant
Supporting Emissions Calculations

PM Emissions =

$$\begin{aligned}
 & \text{PM emission factor [lb/scf] * Sum of } \left[\frac{\text{Each ind. Flow [scfh] * its HHV [Btu/scf]}{1020 \text{ Btu/scf}} \right] \\
 & = \frac{0.0000076 \text{ lb/scf} * \left(\left[\frac{45000 \text{ scf/hr} * 89 \text{ Btu/scf}}{1020 \text{ Btu/scf}} \right] + \left[\frac{30000 \text{ scf/hr} * 93 \text{ Btu/scf}}{1020 \text{ Btu/scf}} \right] + \left[\frac{25000 \text{ scf/hr} * 1020 \text{ Btu/scf}}{1020 \text{ Btu/scf}} \right] \right)}{1020 \text{ Btu/scf}} \\
 & = 0.0000076 \text{ lb/scf} * 31661.76 \text{ scf/hr} = 0.24 \text{ lb PM/hr}
 \end{aligned}$$

CO Emissions =

$$\begin{aligned}
 & \text{CO emission factor [lb/mmBtu] * Total Heat Input [mmbtu/hr]} \\
 & = 0.37 \text{ lb/mmBtu} * 32.3 \text{ mmBtu/hr} \\
 & = 11.95 \text{ lb CO/hr}
 \end{aligned}$$

NOx Emissions =

$$\begin{aligned}
 & \text{NOx emission factor [lb/mmBtu] * Total Heat Input [mmbtu/hr]} \\
 & = 0.068 \text{ lb/mmBtu} * 32.3 \text{ mmBtu/hr} \\
 & = 2.2 \text{ lb NOx/hr}
 \end{aligned}$$

Kanawha Separation Plant
Supporting Emissions Calculations

VOC Emissions =

Waste gas VOC emissions + Natural gas VOC emissions

(assume 95% destruction of VOC's for waste gas and that the natural gas is comprised of 90% methane)

Waste gas VOC emissions = $0.05 * \left[\text{Sum of the individual Flows (excluding natural gas) [lb/hr]} * \text{its VOC ppmv} \right]$

$$= 0.05 * \left[(5130 \text{ lb/hr} * 7625 \text{ parts/1000000}) + (3450 \text{ lb/hr} * 505 \text{ parts/1000000}) \right]$$

$$= 2.04 \text{ lb VOC waste gas/hr}$$

$$\text{Natural gas VOC emissions} = \text{THC emission factor minus 90\% methane content [lb/mmbtu]} * \text{HHV natural gas [Btu/scf]} * \text{Flow of natural gas [scfh]} * \left[\frac{1 \text{ mmbtu}}{1000000 \text{ Btu}} \right]$$

$$= [0.14 \text{ lb/mmbtu} - (0.90 * 0.14 \text{ lb/mmbtu})] * 1020 \text{ Btu/scf} * 250000 \text{ scf/hr} * \frac{1 \text{ mmbtu}}{1000000 \text{ Btu}}$$

$$= 0.36 \text{ lb VOC natural gas/hr}$$

TOTAL VOC emissions

$$= 2.04 \text{ lb VOC waste gas/hr} + 0.36 \text{ lb VOC natural gas/hr}$$

$$= 2.4 \text{ lb total VOC/hr}$$

SAME METHODOLOGY USED FOR BYPASS OPERATION CALCULATIONS!

KANAWHA SEPARATION PLANT
EMISSION RATES FOR TYPICAL OPERATIONAL FLOW RATES

Revised 01/2006

	Carbon Bed Regeneration Flow	Selexol (Tailgas) Flow	Bypass Flow	N.G. Flow	Total
Flow (lb/hr)	5,130	3,450	0	1,250	9,830
Density (lb/scf)	0.114	0.115	0.116	0.050	0.098
Flow (scfh)	45,000	30,000	0	25,000	100,000
HHV (Btu/scf)	89	93	25	1020	
LHV (Btu/scf)	81	84	23	920	
ppmw THC	34,100	30,584	10,000	1,000,000	
ppmw VOC	7625	505	562.5	50,000	
lb/hr combustibles	175	106	0	1,250	1,530

Natural Gas Requirement (scfh to achieve 200 Btu/scf LHV) = 12,271

Total Waste Gas = 8,580 lb/hr
 4.3 ton/hr
 Total Heat Input (MMBtu/hr) = 32.30 (HHV)
 29.17 (LHV)
 Flare Tip ID (inches) = 24
 Flare Tip Temp (F) = 100
 Velocity (fps) = 9.4

	EF	Flare lb/hr	Flare (Note 5) tpy
MMBtu/hr		32.30	
PM (Note 1)	0.0000076	0.24	0.73
CO (Note 2)	0.37	11.95	36.35
NOx (Note 3)	0.068	2.20	6.69
VOC - from waste (Note 4)		2.04	6.21
from gas	0.014	0.36	1.10
Total VOC		2.40	7.30

Notes

1. PM EF from AP-42 for natural gas fired boilers in lb/scf
2. CO EF from AP-42 for flares in lb/MMBtu
3. NOx EF from AP-42 for flares in lb/MMBtu
4. VOC emission factor based on 95% destruction of waste gas VOC + AP-42 flare EF (TOC factor minus 90% methane) in lb/MMBtu for assist gas
5. TPY calculated based on 6084 hr/yr, = 26,100 tpy waste gas
6. Maximum VOC content, Btu content, and density results used from collected test data.

KANAWHA SEPARATION PLANT

Revised 01/2006

EMISSION RATES FOR FLOW RATES WHEN OPERATING IN PARTIAL BYPASS MODE

	Carbon bed Regeneration Flow	Selexol (Tailgas) Flow	Bypass Flow	N.G. Flow	Total
Flow (lb/hr)	5,130	3,450	19,720	4,083	32,383
Density (lb/scf)	0.114	0.115	0.116	0.050	0.099
Flow (scfh)	45,000	30,000	170,000	81,667	326,667
HHV (Btu/scf)	89	93	25	1020	
LHV (Btu/scf)	81	84	23	920	
ppmw THC	34,100	30,584	10,000	1,000,000	
ppmw VOC	7625	505	562.5	50,000	
lb/hr combustibles	175	106	197	4,083	4,561

Natural Gas Requirement (scfh to achieve 200 Btu/scf LHV) = 54,063

Total Waste Gas = 28,300 lb/hr
14.2 ton/hr

Total Heat Input (MMBtu/hr) = 94.35 (HHV)
85.21 (LHV)

Flare Tip ID (inches) = 24

Flare Tip Temp (F) = 100

Velocity (fps) = 30.6

	EF	Flare lb/hr	Flare (Note 5) tpy
MMBtu/hr		94.35	
PM (Note 1)	0.0000076	0.70	0.66
CO (Note 2)	0.37	34.91	32.75
NOx (Note 3)	0.068	6.42	6.02
VOC - from waste (Note 4)		2.60	2.44
from gas	0.014	1.17	1.10
Total VOC		3.77	3.54

Notes

1. PM EF from AP-42 for natural gas fired boilers in lb/scf
2. CO EF from AP-42 for flares in lb/MMBtu
3. NOx EF from AP-42 for flares in lb/MMBtu
4. VOC emission factor based on 95% destruction of waste gas VOC + AP-42 flare EF (TOC factor minus 90% methane) in lb/MMBtu for assist gas
5. TPY calculated 1876 hr/yr, = 26,545 tpy waste gas
6. Maximum VOC content, Btu content, and density results used from collected test data.

KANAWHA SEPARATION PLANT

Revised 01/2006

EMISSION RATES FOR FLOW RATES WHEN OPERATING IN FULL BYPASS MODE

	Carbon Bed Regeneration Flow	Selexol (Tailgas) Flow	Bypass Flow	N.G. Flow	Total
Flow (lb/hr)	5,130	3,450	42,920	7,417	58,917
Density (lb/scf)	0.114	0.115	0.116	0.050	0.099
Flow (scfh)	45,000	30,000	370,000	148,333	593,333
HHV (Btu/scf)	89	93	26	1020	
LHV (Btu/scf)	81	84	23	920	
ppmw THC	34,100	30,584	10,000	1,000,000	
ppmw VOC	7625	505	562.5	50,000	
lb/hr combustibles	175	106	429	7,417	8,126

Natural Gas Requirement (scfh to achieve 200 Btu/scf LHV) = 103,229

Total Waste Gas = 51,500 lb/hr
25.8 ton/hr

Total Heat Input (MMBtu/hr) = 167.72 (HHV)
151.14 (LHV)

Flare Tip ID (inches) = 24

Flare Tip Temp (F) = 100

Velocity (fps) = 55.7

MMBtu/hr	EF	Flare lb/hr	Flare (Note 5) tpy
PM (Note 1)	0.0000076	1.25	0.50
CO (Note 2)	0.37	62.05	24.82
NOx (Note 3)	0.068	11.40	4.56
VOC - from waste (Note 4)		3.25	1.30
from gas	0.014	2.12	0.85
Total VOC		5.37	2.15

Notes

1. PM EF from AP-42 for natural gas fired boilers in lb/scf
2. CO EF from AP-42 for flares in lb/MMBtu
3. NOx EF from AP-42 for flares in lb/MMBtu
4. VOC emission factor based on 95% destruction of waste gas VOC + AP-42 flare EF (TOC factor minus 90% methane) in lb/MMBtu for assist gas
5. TPY calculated based on 800 hr/yr, = 20,600 tpy waste gas
6. Maximum VOC content, Btu content, and density results used from collected test data.

Kanawha Separation Plant

Revised Annual Emission Estimates - Flare Process Emissions ONLY

REV 01/2006

Hours of operation	
Typical 6084	Partial Bypass 1876
Full Bypass 800	

	Typical Operation lb/hr	Partial Bypass Operation lb/hr	Full Bypass Operation lb/hr	Time Weighted Average lb/hr	Typical Operation tpy	Partial Bypass Operation tpy	Bypass Operation tpy	Total tpy
PM	0.24	0.7	1.25	0.43	0.73	0.66	0.50	1.89
SO2				16.01**				70.12**
CO	11.95	34.91	62.05	21.44	36.35	32.75	24.82	93.92
NOx	2.2	6.42	11.4	3.94	6.69	6.02	4.56	17.27
VOC	2.4	3.77	5.37	2.96	7.30	3.54	2.15	12.99
TRS*								0.70

*Assuming 2% of sulfur remains as TRS

** Based on inlet sulfur content of 6.62 gr/100 of and the maximum potential inlet gas flow rate

ADDITIONAL EMISSION SOURCES - FUEL BURNING EQUIPMENT - FUGITIVES									
	Heater (4 mmbtu/hr) lb/hr	Heater (4 mmbtu/hr) tpy	Reclaimer burner (0.35 mmbtu/hr) lb/hr	Reclaimer burner (0.35 mmbtu/hr) tpy	Glycol reboiler (0.5 mmbtu/hr) lb/hr	Glycol reboiler (0.5 mmbtu/hr) tpy	Fugitive and tank emissions lb/hr	Fugitive and tank emissions tpy	
PM	0.03	0.13	<0.01	<0.04	<0.01	0.04			
SO2	<0.01	<0.04	<0.01	<0.04	<0.01	0.04			
CO	0.34	1.49	0.03	0.13	0.04	0.18			
NOx	0.4	1.75	0.04	0.18	0.05	0.22			
VOC	0.02	0.09	<0.01	<0.04	<0.01	<0.04	0.21	0.92	

TOTAL FACILITY EMISSIONS (LISTED ONLY TO DEMONSTRATE THAT THE FACILITY IS BELOW TITLE V THRESHOLDS)
(Includes VOC emission estimates quantified in previous permit applications for tank & fugitive emissions)

PM	2.10
SO2	70.24
CO	95.72
NOx	19.42
VOC	14.08
TRS*	0.70

NOTE: THE FLARE "PROCESS" OPERATIONS ARE THE ONLY PART OF THE FACILITY'S OPERATIONS THAT THE AIR PERMIT COVERS. THE ADDITIONAL FUEL BURNING SOURCES' EMISSIONS, FUGITIVE EMISSIONS, AND TANK EMISSIONS ARE NOT PART OF THE AIR PERMIT AND ARE LISTED ONLY TO DEMONSTRATE THAT THE FACILITY'S TOTAL EMISSIONS ARE BELOW TITLE V THRESHOLDS.

*Assuming 2% of sulfur remains as TRS

ATTACHMENT O: PUBLIC NOTICE

Note: Affidavit of Publication will be submitted upon receipt by Chesapeake from the publisher.

AIR QUALITY PERMIT NOTICE Notice of Application

Notice is given that Chesapeake Appalachia, L.L.C. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Class II Administrative Update for its Kanawha Separation Plant located in Kanawha County, West Virginia. Driving directions to the facility are: Take secondary Route 73 (Campbells Creek Drive), which is located off of US Route 60 a short distance east of the intersection of US Route 60 and Interstate 77. Continue on Campbell's Creek Drive for approximately 3 miles to Point Lick Road. Turn right onto Point Lick Road and travel approximately 3 miles to a "Y" intersection. Take the right fork to the next "Y" intersection, turn left and continue a short distance to the station. Latitude/longitude coordinates are 38.292801, -81.46444.

The applicant estimates that there will be NO CHANGE in the emissions for which the facility is currently permitted.

The proposed update will occur after the updated permit is issued on or about November 15, 2016. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the 9th of September 2016

By: Chesapeake Appalachia, L.L.C.
Joe Ketzner
Vice President
P.O. Box 18496
Oklahoma City, OK 73154-0496