ATLANTIC COAST PIPELINE, LLC
ATLANTIC COAST PIPELINE

and

DOMINION TRANSMISSION, INC.
SUPPLY HEADER PROJECT

Supplemental Filing
June 17, 2016

APPENDIX B

Updated Air Permit Application for Compressor Station 2 (Buckingham Compressor Station)

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

Web Address: www.dom.com

May 25, 2016

BY: OVERNIGHT MAIL

Mr. Allen Armistead
Air Permit Engineer
Blue Ridge Regional Office
Virginia Department of Environmental Quality
7705 Timberlake Road
Lynchburg, VA 24502

Subject: Buckingham Compressor Station
Minor Permit Equipment Change

Dear Mr. Armistead:

Atlantic Coast Pipeline, LLC is submitting an update to the proposed Buckingham Compressor Station permit application, dated September 16, 2015, to change one of the compressor turbines from a Solar Taurus 60 to a Solar Titan 130 (CT-03). No other changes are requested for the compressors or ancillary equipment. The change does not affect the applicable regulatory requirements. The updated application Form 7 is included as Attachment 1 to this letter.

The Solar Titan 130 turbine will be equipped with the same emission controls proposed for the other turbines including selective catalytic reduction to control NO_X emissions and oxidation catalyst to control CO and VOC emissions. The Solar Titan 130 operating data and emission control equipment design data are included in Attachment 2.

Revised emission calculations are provided in Attachment 3 based on the same operating assumptions used in the original application. The changes in total compression and annual emissions are summarized in the following table.

	Compression (hp)	Annual Emissions (Tons/Year)					
		NO_X	CO	VOC	PM	SO_2	CO_{2e}
Original Application	44,512	41.5	75.8	57.6	35.1	5.8	292,856
Proposed Update	57,863	50.2	95.2	32.7	43.9	7.3	323,736

A detailed plan showing the location of site structures and equipment is also included with this submittal as Attachment 4.

The air quality modeling study conducted to support the permit application will be submitted separately after DEQ confirmation of the updated emission limits.

If you have questions about this submittal, please do not hesitate to contact Mr. William Scarpinato at (804) 273-3019 or at william.a.scarpinato@dom.com.

Very truly yours,

Robert Bisha, Technical Advisor
Atlantic Coast Pipeline
Dominion Environmental Services

Attachment 1: Form 7
Attachment 2: Equipment Design Data
Attachment 3: Emission Calculation
Attachment 4: Site Plan

ATTACHMENT 1

VIRGINIA DEPARTMENT OF ENVIORNMENTAL QUALITY FORM 7

PERMIT FORMS
PURSUANT TO
REGULATIONS FOR THE CONTROL AND ABATEMENT OF AIR POLLUTION

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR PERMITS
FORM 7 APPLICATION

NEW SOURCE REVIEW PERMITS
and STATE OPERATING PERMITS

AIR PERMIT APPLICATION
CHECK ALL PAGES ATTACHED AND LIST ALL ATTACHED DOCUMENTS

___ Local Government Certification Form, Page 3
___ Application Fee Form, Pages 4-6
1 Document Certification Form, Page 7
1 General Information, Pages 8-9
1 Fuel Burning Equipment, Page 10
1 Stationary Internal Combustion Engines, Page 11
___ Incinerators, Page 12
___ Processing, Page 13
___ Inks, Coatings, Stains, and Adhesives, Page 14
1 VOC/Petroleum Storage Tanks, Pages 15-16
___ Loading Rack and Oil-Water Separators, Page 17
___ Fumigation Operations, Page 18
1 Air Pollution Control and Monitoring Equipment, Page 19
1 Air Pollution Control/Supplemental Information, Page 20
1 Stack Parameters and Fuel Data, Page 21
1 Proposed Permit Limits for Criteria Pollutants, Page 22
1 Proposed Permit Limits for Toxic Pollutants/HAPs, Page 23
___ Proposed Permit Limits for Other Reg. Pollutants, Page 24
___ Proposed Permit Limits for GHGs on Mass Basis, Page 25
___ Proposed Permit Limits for GHGs on CO_2e Basis, Page 26
___ BAE for Criteria Pollutants, Page 27
___ BAE for GHGs on Mass Basis, Page 28
___ BAE for GHGs on CO_2e Basis, Page 29
1 Operating Periods, Page 30

3 ATTACHED DOCUMENTS:
___ Map of Site Location
1 Facility Site Plan
___ Process Flow Diagram/Schematic
___ MSDS or CPDS Sheets
1 Estimated Emission Calculations
___ Stack Tests
___ Air Modeling Data
___ Confidential Information (see Instructions)
___ BACT Analysis
1 Vendor Specifications
Permit Application Narrative

Check added form sheets above; also indicate the number of copies of each form in blank provided.

DOCUMENT CERTIFICATION FORM

I certify under penalty of law that this document and all attachments [as noted above] were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering and evaluating the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I certify that I understand that the existence of a permit under [Article 6 of the Regulations] does not shield the source from potential enforcement of any regulation of the board governing the major NSR program and does not relieve the source of the responsibility to comply with any applicable provision of the major NSR regulations.

SIGNATURE: _____ DATE: 5/18/15

NAME: Leslie Hartz REGISTRATION NO: _____

TITLE: VP Pipeline Construction COMPANY: Atlantic Coast Pipeline, LLC.

PHONE: (804) 771-4468 ADDRESS: 707 E. Main Street

EMAIL: leslie.hartz@dom.com Richmond, VA 23219

References: Virginia Regulations for the Control and Abatement of Air Pollution (Regulations), 9 VAC 5-20-230B and 9 VAC 5-80-1140E.

GENERAL INFORMATION

Person Completing Form: Robert Sawyer	Date: 03/2016	Registration Number: NA
Company and Division Name: Environmental Resources Management		FIN:
Mailing Address: 180 Admiral Cochrane Drive Suite 400 Annapolis, MD 21401		
Exact Source Location – Include Name of City (County) and Full Street Address or Directions: Buckingham County, Virginia		
Telephone Number: (410) 266-0006	No. of Employees:	Property Area at Site:
Person to Contact on Air Pollution Matters – Name and Title: William Scarpinato	Phone Number: (804) 273-3019 Fax: Email:	
Latitude and Longitude Coordinates **OR** UTM Coordinates of Facility: Latitude: 37°35'23.29" Longitude: 78°39'31.48"		

Reason(s) for Submission (Check all that apply):

☐ State Operating Permit

This permit is applied for pursuant to provisions of the Virginia Administrative Code, 9 VAC 5 Chapter 80, Article 5 (SOP)

☒ New Source

☐ Modification of a Source

☐ Relocation of a Source

This permit is applied for pursuant to the following provisions of the Virginia Administrative Code:

- ☒ 9 VAC 5 Chapter 80, Article 6 (Minor Sources)
- ☐ 9 VAC 5 Chapter 80, Article 8 (PSD Major Sources)
- ☐ 9 VAC 5 Chapter 80, Article 9 (Non-Attainment Major Sources)

☐ Amendment to a Permit Dated: _____ Permit Type: ☐ SOP (Art. 5) ☐ NSR (Art. 6, 8, 9)

Amendment Type:

- ☐ Administrative Amendment
- ☐ Minor Amendment
- ☐ Significant Amendment

This amendment is requested pursuant to the provisions of:

- ☐ 9 VAC 5-80-970 (Art. 5 Adm.)
- ☐ 9 VAC 5-80-980 (Art. 5 Minor)
- ☐ 9 VAC 5-80-990 (Art. 5 Sig.)
- ☐ 9 VAC 5-80-1270 (Art. 6 Adm.)
- ☐ 9 VAC 5-80-1280 (Art. 6 Minor)
- ☐ 9 VAC 5-80-1290 (Art. 6 Sig.)
- ☐ 9 VAC 5-80-1935 (Art. 8 Adm.)
- ☐ 9 VAC 5-80-1945 (Art. 8 Minor)
- ☐ 9 VAC 5-80-1955 (Art. 8 Sig.)
- ☐ 9 VAC 5-80-2210 (Art. 9 Adm.)
- ☐ 9 VAC 5-80-2220 (Art. 9 Minor)
- ☐ 9 VAC 5-80-2230 (Art. 9 Sig.)

☐ Other (specify): _____

Explanation of Permit Request (attach documents if needed):

Atlantic Coast Pipeline, LLC (ACP, LLC) proposes to construct and operate the Buckingham Compressor Station in Buckingham County, Virginia to provide compression to support the transmission of natural gas. An adjacent metering and regulating (M&R) station (Woods Corner) has been included as part of this application for the Buckingham Compressor Station.

APC, LLC submits this Article 6 permit application update to the Virginia Department of Environmental Quality (DEQ), Blue Ridge Regional Office for the authority to construct the Buckingham Compressor Station in Buckingham County, Virginia.

GENERAL INFORMATION (CONTINUED)

For Portable Plants:

Is this facility designed to be portable? ☐ Yes ☒ No

- If yes, is this facility already permitted as a portable plant? ☐ Yes ☐ No Permit Date: _____

If not permitted, is this an application to be permitted as a portable plant? ☐ Yes ☒ No

If permitted as a portable facility, is this a notification of relocation? ☐ Yes ☐ No

- Describe the new location or address (include a site map): _____

- Will the portable facility be co-located with another source? ☐ Yes ☐ No Reg. No. _____
- Will the portable facility be modified or reconstructed as a result of the relocation? ☐ Yes ☐ No
- Will there be any new emissions other than those associated with the relocation? ☐ Yes ☐ No
- Is the facility suitable for the area to which it will be located? (attach documentation) ☐ Yes ☐ No

Describe the products manufactured and/or services performed at this facility:

The facility serves as a natural gas compression and transmission station along the Atlantic Coast Pipeline (ACP), helping to deliver natural gas from Pennsylvania and West Virginia to Virginia and North Carolina.

List the Standard Industrial Classification (SIC) Code(s) for the facility:

4	9	2	2																

List the North American Industry Classification System (NAICS) Code(s) for the facility:

4	8	6	2	1	0																		

List all the facilities in Virginia under common ownership or control by the owner of this facility:

Milestones: This section is to be completed if the permit application includes a new emissions unit or modification to existing operations.

Milestones*:	Starting Date:	Estimated Completion Date:
New Equipment Installation	April 2017	November 2018
Modification of Existing Process or Equipment		
Start-up Dates		

*For new or modified installations to be constructed in phased schedule, give construction/installation starting and completion date for each phase.

FUEL BURNING EQUIPMENT: (Boilers, Turbines, Kilns, and Other External Combustion Units)

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Equipment Manufacturer, Type, and Model Number	Date of Manuf.	Date of Const.	Max. Rated Input Heat Capacity For Each Fuel (Million Btu/hr)	Type of Fuel	Type of Equip. (use Code A)	Usage (use Code B)	Requested Throughput* (hrs/yr OR fuel/yr)	Federal Regulations that Apply
WH-01	Boiler (Manufacturer and Model Number TBD)	TBD	4/1/17	9.5	Natural Gas	12	3	8,760 hrs/yr	40 CFR Part 98
LH-01	ETI, Line Heater, WB HTR		4/1/17	17	Natural Gas	12	4	8,760 hrs/yr	40 CFR Part 98 40 CFR 60 Subpart Dc
LH-02	ETI, Line Heater, WB HTR		4/1/17	17	Natural Gas	12	4	8,760 hrs/yr	40 CFR Part 98 40 CFR 60 Subpart Dc
LH-03	ETI, Line Heater, WB HTR		4/1/17	17	Natural Gas	12	4	8,760 hrs/yr	40 CFR Part 98 40 CFR 60 Subpart Dc
LH-04	ETI, Line Heater, WB HTR		4/1/17	17	Natural Gas	12	4	8,760 hrs/yr	40 CFR Part 98 40 CFR 60 Subpart Dc

[X] Estimated Emission Calculations Attached (include references of emission factors) and/or Stack Test Results if Available

Code A – Equipment

BOILER TYPE:
1. Pulverized Coal - Wet Bottom
2. Pulverized Coal - Dry Bottom
3. Pulverized Coal - Cyclone Furnace
4. Circulating Fluidized Bed
5. Spreader Stoke
6. Chain or Travelling Grate Stoker
7. Underfeed Stoker
8. Hand Fired Coal
9. Oil, Tangentially Fired
10. Oil, Horizontally Fired (except rotary cup)
11. Gas, Tangentially Fired
12. Gas, Horizontally Fired
13. Wood with Flyash Reinjection
14. Wood without Flyash Reinjection
15. Other (specify) _____

OTHER COMBUSTION UNITS:
16. Oven / Kiln
17. Rotary Kiln
18. Process Furnace
19. Other (specify) _____

Code B - Usage

1. Steam Production
2. Drying / Curing
3. Space Heating
4. Process Heat
5. Food Processing
6. Electrical Generation
7. Mechanical Work
8. Other (specify) _____

***Pick only one option for a requested throughput.**

NOTE: Dryers, kilns, and furnaces also have to fill out Page 13.

STATIONARY INTERNAL COMBUSTION ENGINES:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Equipment Manufacturer, Type, and Model Number	Date of Manuf.	Date of Const.	Output Brake Horsepower (bhp)	Output Electrical Power (kW)	Type of Fuel	Usage* (use Code C)	Requested Throughput** (hrs/yr OR fuel/yr)	Federal Regulations that Apply
CT-01	Solar, Mars Turbine, 100-16000S		4/1/17	17,574	13,105	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98 NSPS Subpart KKKK
CT-02	Solar, Taurus Turbine, 70-10802S		4/1/17	11,882	8,860	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98 NSPS Subpart KKKK
CT-03	Solar, Titan Turbine, 130-20502S		4/1/17	21,765	16,230	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98 NSPS Subpart KKKK
CT-04	Solar, Centaur Turbine, 50-6200LS		4/1/17	6,642	4,953	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98 NSPS Subpart KKKK
MT-01	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-02	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-03	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-04	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-05	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-06	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-07	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-08	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-09	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98
MT-10	Capstone, MicroTurbine, C200		4/1/17	268	200	Natural Gas	3	8,760 hrs/yr	40 CFR Part 98

[X] Estimated Emission Calculations Attached (include references of emission factors and manufacturer specifications per engine) and/or Stack Test Results if Available

Code C – Usage

1. Emergency Generator
2. Participates in Emergency Load Response Program
3. Non-Emergency Generator
4. Participates in Demand Response Program(s)
5. Other (specify) _____

***Can pick more than one option**
(i.e. 1 and 2 OR 3 and 4)

****Pick only one option for a requested throughput.**

LIQUID AND/OR SOLID WASTE INCINERATORS: (NOT AN AIR EMISSIONS CONTROL DEVICE)

Company Name:	Date:	Registration Number:

Unit Ref. No.	Equipment Manufacturer, Type, and Model Number	Date of Manuf.	Date of Const.	Incin. Max. Rated Capacity (lbs/hr)	Burner Rated Capacity (Btu/hr)		Minimum Chamber Temp. (°F)		Requested Throughput to be Incinerated		Incin. Type (use Code D)	Waste Type (use Code E)	Min. Secondary Chamber Retention Time (sec)	Burn Down Cycle Time (hrs)	Federal Regulations that Apply
					Pri.	Sec.	Pri.	Sec.	Lbs hr	Tons yr					

☐ Estimated Emission Calculations Attached (include references of emission factors) and/or Stack Test Results if Available

Code D – Incinerator Type	Code E – Waste Type
1. Rotary Kiln 2. Mass Burn/Refuse Derived Fuel 3. Crematory 4. Single Chamber 5. Multiple Chamber 6. Other (specify) _____	1. Paper Waste 2. Hospital Waste 3. Medical Waste 4. Municipal Waste 5. Animal Waste 6. Crematory Waste (Human Remains) 7. Industrial Waste 8. Other (specify) _____

PROCESSING, MANUFACTURING, SURFACE COATING AND DEGREASING OPERATIONS:

Company Name:	Date:	Registration Number:

Unit Ref. No.	Process or Operation Name	Equipment Manufacturer, Type, and Model Number	Date of Manuf.	Date of Const.	Max. Rated Capacity (_____/hr)*	Requested Throughput*			Federal Regulations that Apply
						(_____/hr)	(_____/day)	(_____/yr)	

☐ Estimated Emission Calculations Attached (include references of emission factors) and/or Stack Test Results if Available

*** Specify units for each operation in tons, pounds, gallons, etc., as applicable. For coating operations, the maximum rated capacity is the spray gun capacity.**

INKS, COATINGS, STAINS, AND ADHESIVES:

Company Name:	Date:	Registration Number:

Unit Ref. No.	Coating Material (specify)	Coating Use (use Code F)	Lbs VOC in Coating as Applied			VOC Control Method (use Code G)	Solids Transfer Efficiency (%)	Coating Density as Applied (lbs/gal)	Maximum Coating Usage as Applied	
			Per gal coating	Per gal coating less water & exempt solvent	Per gal solids				(Gal/hr)	(Gal/yr)

Hazardous Air Pollutants (HAPs)	Lbs HAP/gal coating as applied	Hazardous Air Pollutants (HAPs)	Lbs HAP/gal coating as applied
CAS #: HAP Name:		CAS #: HAP Name:	
CAS #: HAP Name:		CAS #: HAP Name:	
CAS #: HAP Name:		CAS #: HAP Name:	

☐ Estimated Emission Calculations Attached (include references of emission factors and MSDS or CPDS for each coating)

Code F – Coating Use

1. Large Appliance Coatings
2. Magnet Wire Coatings
3. Auto and Light Duty Truck Coatings
   a. Prime Coat
   b. Guidecoat
   c. Topcoat
   d. Final Repair
   e. Anti-chip
   f. Anti-chip extreme performance
   g. Anti-chip visible surface
4. Aerospace Industries Coating
5. Magnetic Tape Coating
6. Can Coatings
   a. Base/Overvarnish
   b. Internal body/external ends
   c. 3-piece Can, side seam
   d. End seals
7. Metal Coil Coating
8. Non-Printing Paper/Fabric Coating
9. Publication Printing Inks and Coatings
10. Packaging Printing Inks and Coatings
11. Vinyl Coatings
12. Metal Furniture Coatings
13. Plastic Parts and Products Coatings
14. Miscellaneous Metal Parts Coatings
    a. Clear coatings
    b. Air-dried Coatings
    c. Extreme Performance Coatings
    d. Other coatings
15. Flatwood Paneling Coatings
    a. Printed Hardwood/Particleboard
    b. Natural finish Hardwood/Plywood
    c. Class II Hardboard
16. Paper and other Webs
17. Shipbuilding and Ship Repair Coating
18. Wood Furniture Coating
19. Flexographic Ink
20. Lithographic Ink
21. Rotogravure Ink
22. Adhesives – describe:_____
23. Other:_____

Code G – VOC Control Method

1. Low-VOC Coatings
   a. High-Solids Coatings
   b. Low-Solvent Coatings
   c. Waterborne Coatings
   d. Powder Coatings
   e. UV Light/Electron Beam Cured Coatings
   f. Electrodeposited Waterborne Coatings
2. Increased Solids Transfer Efficiency
3. Carbon Adsorption
4. Incineration
5. Regenerative Thermal Oxidizer (RTO)
6. Enclosures - Partial _____ % or Capture Efficiency _____ %
7. Other:_____

NOTE: Fill out one page for each ink, coating, stain, and adhesive.

VOLATILE ORGANIC COMPOUND (VOC)/PETROLEUM LIQUID STORAGE TANKS:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Tank Type (use Code H)	Source of Tank Contents (use Code I)	Date of Manuf.	Date of Const.	Material Stored - Name and CAS # (include Reid Vapor Pressure for Gasoline)	Max. True Vapor Pressure (psia)	Density* (lbs/gal)	Max. Average Storage Temp. (°F)	Tank Diameter (feet)	Tank Capacity (gal)	Requested Throughput (gal/yr)	Federal Regulations that Apply
TK-1	1b	5		4/1/17	Hydrocarbons (Produced Fluids)	5.6	6.67 (@ 100°F)	80	4.61	2,500	12,500	
TK-2	1b	5		4/1/17	Hydrocarbons (Lube Oil)	0.0001	7.51 (@ 20°C)	80	4.12	2,000	10,000	
TK-3	1b	3		4/1/17	Ammonia 7664-41-7			80	8.24	8,000	96,000	

[X] Estimated Emission Calculations Attached (include TANKS Program printouts)

Code H – Tank Type

1. Fixed Roof
   a. Vertical Tank
   b. Horizontal Tank
2. Floating Roof
   a. Internal (welded deck)
   b. Internal (bolted deck) – Specify Panel or Sheet
   c. External (welded deck)
   d. External (riveted deck)
3. Variable Vapor Space
4. Pressure Tank (over 15 psig)
5. Underground Splash Loading
6. Underground Submerged Loading
7. Underground Submerged Loading, Balanced
8. Other:_____

Code I – Source of Tank Contents

1. Pipeline
2. Rail Car
3. Tank Truck
4. Ship or Barge
5. Process

*** Specify the ASTM temperature standard at which the density was measured.**

VOLATILE ORGANIC COMPOUND (VOC)/PETROLEUM LIQUID STORAGE TANKS (CONTINUED):

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Tank Color		Fixed Roof Only					Floating Roof Only				
	Shell	Roof	Internal Tank Height or Length (feet)	Max. Hourly Filling (gallons)	External Fixed Roof			Seal Type (use Code J)	Max. Hourly Withdrawal (gallons)	Internal Floating Roof		
					Type of Roof (cone or dome)	Cone height (ft) and slope (ft/ft)	Dome height (ft) and radius (ft)			Self Supporting?	If no, No. of Columns	If no, Column Diameter (ft)
TK-1	Gray/ Light	Gray/ Light	20									
TK-2	Gray/ Light	Gray/ Light	20									
TK-3	Gray/ Light	Gray/ Light	20									

Code J – Seal Type (Pontoon External Only)

1. Mechanical Shoe
   a. Primary only
   b. Shoe mounted secondary
   c. Rim mounted secondary
2. Liquid Mounted
   a. Primary only
   b. Weather shield secondary
   c. Rim mounted secondary
3. Vapor Mounted
   a. Primary only
   b. Weather shield secondary
   c. Rim mounted secondary

(Double Deck External Only)

4. Mechanical Shoe
   a. Primary only
   b. Shoe mounted secondary
   c. Rim mounted secondary
5. Liquid Mounted
   a. Primary only
   b. Weather shield secondary
   c. Rim mounted secondary
6. Vapor Mounted
   a. Primary only
   b. Weather shield secondary
   c. Rim mounted secondary

(Internal Only)

7. Mechanical Shoe
   a. Primary only
   b. Shoe mounted secondary
   c. Rim mounted secondary
8. Liquid Mounted
   a. Primary only
   b. Rim mounted secondary
9. Vapor Mounted
   a. Primary only
   b. Rim mounted secondary

LOADING RACKS AND OIL-WATER SEPARATORS:

Company Name:	Date:	Registration Number:

Unit Ref. No.	Name of Product Loaded or Recovered	Max. Hourly Throughput (gallons)	Requested Annual Throughput (gallons)	Loading Racks Only		Oil-Water Separators Only	Federal Regulations that Apply
				Type of Loading (use Code K)	Hatch Vapor Closure on Loading Arms (use Code L)	Type of Enclosure (use Code M)	

☐ Estimated Emission Calculations Attached

Code K – Type of Loading	Code L – Hatch Vapor Closure	Code M – Type of Enclosure
1. Overhead Loading - splash fill, normal service 2. Overhead Loading - submerged fill, normal service 3. Bottom Loading - normal service 4. Overhead Loading - splash fill, balanced service 5. Overhead Loading - submerged fill, balanced service 6. Bottom Loading - Balanced service	1. None, open to air 2. Emco – Wheaton 3. OPW 4. Chiksan – LTV 5. Other:_____	1. Open 2. Partially Open 3. Floating Roof 4. Sealed Cover

FUMIGATION OPERATIONS:

Company Name:	Date:	Registration Number:

Unit Ref. No.	Object or Product to be Fumigated	Containment System	Fumigant	Max. Daily Fumigant Usage* (lbs/day or g/day)	Max. Annual Fumigant Usage* (lbs/yr or g/yr)	Estimated Number of Fumigation Events Per Year	Aeration Method	Distance from Fumigation Operation to Property or Fence Line (feet)

☐ Estimated Emission Calculations Attached

☐ Fumigation Operation is less than 300 feet to an area occupied by people

*** Specify units for each operation in pounds (methyl bromide) or grams (phosphine) per day or year.**

AIR POLLUTION CONTROL AND MONITORING EQUIPMENT:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Vent/ Stack No.	Device Ref. No.	Pollutant/ Parameter	Air Pollution Control Equipment			Monitoring Instrumentation
				Manufacturer and Model No.	Type (use Code N)	Percent Efficiency (%)	Specify Type, Measured Pollutant, and Recorder Used
CT-01	CT-01	SCR-01	NOx	TBD	16	44.4	Combustion controls. Stack test for compliance demonstration
CT-01	CT-01	OC-01	CO VOC	TBD – Industry accepted reduction from oxidation catalyst	20	80 50	Combustion controls. Stack test for compliance demonstration
CT-02	CT-02	SCR-02	NOx	TBD	16	44.4	Combustion controls. Stack test for compliance demonstration
CT-02	CT-02	OC-02	CO VOC	TBD – Industry accepted reduction from oxidation catalyst	20	80 50	Combustion controls. Stack test for compliance demonstration
CT-03	CT-03	SCR-03	NOx	TBD	16	44.4	Combustion controls. Stack test for compliance demonstration
CT-03	CT-03	OC-03	CO VOC	TBD – Industry accepted reduction from oxidation catalyst	20	80 50	Combustion controls. Stack test for compliance demonstration
CT-04	CT-04	SCR-04	NOx	TBD	16	44.4	Combustion controls. Stack test for compliance demonstration
CT-04	CT-04	OC-04	CO VOC	TBD – Industry accepted reduction from oxidation catalyst	20	80 50	Combustion controls. Stack test for compliance demonstration

☐ Manufacturer Specifications Included

Code N – Type of Air Pollution Control Equipment

1. Settling Chamber
2. Cyclone
3. Multicyclone
4. Cyclone scrubber
5. Orifice scrubber
6. Mechanical scrubber
7. Venturi scrubber
   a. Fixed throat
   b. Variable throat
8. Mist eliminator
9. Filter
   a. Baghouse
   b. Other:_____
10. Electrostatic Precipitator
    a. Hot side
    b. Cold side
    c. High voltage
    d. Low voltage
    e. Single stage
    f. Two stage
    g. Other:_____
11. Catalytic Afterburner
12. Direct Flame Afterburner
13. Diesel Oxidation Catalyst (DOC)
14. Thermal Oxidizer
15. Regenerative Thermal Oxidizer (RTO)
16. Selective Catalytic Reduction (SCR)
17. Selective Non-Catalytic Reduction (SNCR)
    17. Absorber
    a. Packed tower
    b. Spray tower
    c. Tray tower
    d. Venturi
    e. Other:_____
    18. Adsorber
    a. Activated carbon
    b. Molecular sieve
    c. Activated alumina
    d. Silica gel
    e. Other:_____
    19. Condenser (specify)
    20. Other: Oxidation Catalyst (OxCat)

AIR POLLUTION CONTROL EQUIPMENT - SUPPLEMENTAL INFORMATION:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Device Ref. No.	Type (use Code N)	Liquid Flow Rate (gpm) (4, 5, 6, 7, 17 ,19)	Liquid Medium (4, 5, 6, 7, 17, 19)	Cleaning Method (9, 10, 17, 18)	Number of Fields (10)	Number of Sections (9, 10)	Air to Cloth Ratio (fpm) (9)	Filter Material (9)	Inlet Temp. (°F)	Regeneration Method & Cycle Time (sec) (18)	Chamber Temp. (°F) (11, 12, 14, 15)	Retention Time (sec) (11, 12, 14, 15)	Pressure Drop (inch H_2O) (3, 4, 5, 6, 7, 9, 17)
SCR-01	16								925				
OC-01	20								750				
SCR-02	16								925				
OC-02	20								750				
SCR-03	16								925				
OC-03	20								750				
SCR-04	16								925				
OC-04	20								750				

NOTE: **Numbers listed in parenthesis in the columns above represent the Control Equipment in Code N below.**

Code N – Type of Air Pollution Control Equipment

1. Settling Chamber
2. Cyclone
3. Multicyclone
4. Cyclone scrubber
5. Orifice scrubber
6. Mechanical scrubber
7. Venturi scrubber
   a. Fixed throat
   b. Variable throat
8. Mist eliminator
9. Filter
   a. Baghouse
   b. Other:_____
10. Electrostatic Precipitator
    a. Hot side
    b. Cold side
    c. High voltage
    d. Low voltage
    e. Single stage
    f. Two stage
    g. Other:_____
11. Catalytic Afterburner
12. Direct Flame Afterburner
13. Diesel Oxidation Catalyst (DOC)
14. Thermal Oxidizer
15. Regenerative Thermal Oxidizer (RTO)
16. Selective Catalytic Reduction (SCR)
17. Selective Non-Catalytic Reduction (SNCR)
    17. Absorber
        a. Packed tower
        b. Spray tower
        c. Tray tower
        d. Venturi
        e. Other:_____
    18. Adsorber
        a. Activated carbon
        b. Molecular sieve
        c. Activated alumina
        d. Silica gel
        e. Other:_____
    19. Condenser (specify)
    20. Other: Oxidation Catalyst (OxCat)

STACK PARAMETERS AND FUEL DATA:

Company Name:	Atlantic Coast Pipeline, LLC	Date:	03/2016	Registration Number:	NA

Unit Ref. No.	Vent/ Stack No.	Vent/Stack or Exhaust Data						Fuel(s) Data				
		Vent/Stack Config. (use Code O)	Vent/Stack Height (feet)	Exit Diameter (feet)	Exit Gas Velocity (ft/sec)	Exit Gas Flow Rate (acfm)	Exit Gas Temp. (°F)	Type of Fuel	Heating Value (Btu/scf)	Max. Rated Burned/hr (Mscf/hr)	Max. Sulfur %	Max. Ash %
CT-01	CT-01	5	70	10.0	46.9	220,785	750	Natural Gas	1020	127.10	0.0005	0
CT-02	CT-02	5	70	7.5	56.0	148,553	750	Natural Gas	1020	85.56	0.0005	0
CT-03	CT-03	5	70	10.0	58.8	277,243	750	Natural Gas	1020	154.25	0.0005	0
CT-04	CT-04	5	70	6.0	58.0	98,384	750	Natural Gas	1020	53.48	0.0005	0
WH-01	WH-01	5	18	0.7	247.3	5,231	838	Natural Gas	1020	9.31	0.0005	0
LH-01	LH-01	5	23	1.9	16.7	2,957	982	Natural Gas	1020	16.67	0.0005	0
LH-02	LH-02	5	23	1.9	16.7	2,957	982	Natural Gas	1020	16.67	0.0005	0
LH-03	LH-03	5	23	1.9	16.7	2,957	982	Natural Gas	1020	16.67	0.0005	0
LH-04	LH-04	5	23	1.9	16.7	2,957	982	Natural Gas	1020	16.67	0.0005	0
MT-01	MT-01	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-02	MT-02	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-03	MT-03	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-04	MT-04	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-05	MT-05	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-06	MT-06	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-07	MT-07	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-08	MT-08	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-09	MT-09	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
MT-10	MT-10	5	25	2.5	8.9	2,621	535	Natural Gas	1020	2.24	0.0005	0
TK-1	TK-1	6	4.6				80	---	---	---	---	---
TK-2	TK-2	6	4.1				80	---	---	---	---	---
TK-3	TK-3	6	8.2				80	---	---	---	---	---

Code O – Vent/Stack Configuration

1. Stack discharging downward, or nearly download
2. Equivalent stack representing a combination of multiple actual stacks
3. Gooseneck stack
4. Stack discharging in a horizontal direction
5. Stack with an unobstructed opening discharge in a vertical direction
6. Vertical stack with a weather cap or similar obstruction in exhaust system

PROPOSED PERMIT LIMITS FOR CRITERIA POLLUTANTS:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Proposed Permit Limits for Criteria Pollutants															
	PM [a] (Particulate Matter)		PM-10 [a,b] (10 µM or smaller particulate matter)		PM 2.5 [a,b] (2.5 µM or smaller particulate matter)		SO_2 (Sulfur Dioxide)		NO_X (Nitrogen Oxides)		CO (Carbon Monoxide)		VOC [a] (Volatile Organic Compounds)		Pb (Lead)	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CT-01	2.85	12.5	2.85	12.5	2.85	12.5	0.485	2.12	***	12.3	***	20.7	***	1.14	---	---
CT-02	1.92	8.41	1.92	8.41	1.92	8.41	0.326	1.43	***	8.35	***	13.1	***	0.775	---	---
CT-03	3.46	15.2	3.46	15.2	3.46	15.2	0.588	2.58	***	15.0	***	27.8	***	1.43	---	---
CT-04	1.20	5.26	1.20	5.26	1.20	5.26	0.204	0.894	***	5.20	***	8.19	***	0.477	---	---
WH-01	0.071	0.310	0.071	0.310	0.071	0.310	0.006	0.024	0.466	2.04	0.782	3.43	0.051	0.224	---	---
LH-01	0.119	0.521	0.119	0.521	0.119	0.521	0.010	0.044	0.187	0.819	0.629	2.76	0.102	0.447	---	---
LH-02	0.119	0.521	0.119	0.521	0.119	0.521	0.010	0.044	0.187	0.819	0.629	2.76	0.102	0.447	---	---
LH-03	0.119	0.521	0.119	0.521	0.119	0.521	0.010	0.044	0.187	0.819	0.629	2.76	0.102	0.447	---	---
LH-04	0.119	0.521	0.119	0.521	0.119	0.521	0.010	0.044	0.187	0.819	0.629	2.76	0.102	0.447	---	---
MT-01	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-02	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-03	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-04	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-05	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-06	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-07	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-08	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-09	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
MT-10	0.005	0.020	0.005	0.020	0.005	0.020	0.002	0.010	0.092	0.403	0.250	1.10	0.020	0.088	---	---
FUG-01	---	---	---	---	---	---	---	---	---	---	---	---	5.65	24.7	---	---
FUG-02	---	---	---	---	---	---	---	---	---	---	---	---	0.210	0.919	---	---
TK-1	---	---	---	---	---	---	---	---	---	---	---	---	0.080	0.350	---	---
TK-2	---	---	---	---	---	---	---	---	---	---	---	---	4E-6	2E-5	---	---
TOTAL:	10.0	43.9	10.0	43.9	10.0	43.9	1.67	7.33	***	50.2	***	95.2	***	32.7	---	---

***Note: These NO_X, CO, and VOC lb/hr emission rates vary by operating scenario. Please see the permit application narrative for details.

[X] Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

[a] PM, PM-10, PM 2.5, and VOC should also be split up by component and reported under the Proposed Permit Limits for Toxic Pollutants/HAPs.
[b] PM-10 and PM 2.5 includes filterable and condensable.

PROPOSED PERMIT LIMITS FOR TOXIC POLLUTANTS/HAPS:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Proposed Permit Limits for Toxic/HAP Pollutants*															
	HAP Name: Formaldehyde CAS #: 50-00-0		HAP Name: Hexane CAS #: 110-54-3		HAP Name: CAS #:		HAP Name: CAS #:		HAP Name: CAS #:		HAP Name: CAS #:		HAP Name: CAS #:		HAP Name: CAS #:	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CT-01	0.187	0.818	---	---												
CT-02	0.126	0.550	---	---												
CT-03	0.227	0.992	---	---												
CT-04	0.079	0.344	---	---												
WH-01	0.001	0.003	0.017	0.073												
LH-01	0.001	0.005	0.030	0.131												
LH-02	0.001	0.005	0.030	0.131												
LH-03	0.001	0.005	0.030	0.131												
LH-04	0.001	0.005	0.030	0.131												
MT-01	5E-4	0.003	---	---												
MT-02	5E-4	0.003	---	---												
MT-03	5E-4	0.003	---	---												
MT-04	5E-4	0.003	---	---												
MT-05	5E-4	0.003	---	---												
MT-06	5E-4	0.003	---	---												
MT-07	5E-4	0.003	---	---												
MT-08	5E-4	0.003	---	---												
MT-09	5E-4	0.003	---	---												
MT-10	5E-4	0.003	---	---												
FUG-01	---	---	0.319	1.40												
FUG-02	---	---	0.012	0.052												
TK-1	---	---	---	---												
TK-2	---	---	---	---												
TOTAL:	0.628	2.75	0.438	1.92												

[X] Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

*** Specify the name of the toxic pollutant/HAP for each Unit Ref. No. along with the respective CAS Number.** Toxic Pollutant means a pollutant on the designated list in the Form 7 Instructions document. Particulate matter and volatile organic compounds are not toxic pollutants as generic classes of substances, but individual substances within these classes may be toxic pollutants because their toxic properties or because a TLV (tm) has been established.

PROPOSED PERMIT LIMITS FOR OTHER REGULATED POLLUTANTS:

Company Name:	Date:	Registration Number:

Unit Ref. No.	Proposed Permit Limits for Other Regulated Pollutants*															
	Pollutant Name:		Pollutant Name:		Pollutant Name:		Pollutant Name:		Pollutant Name:		Pollutant Name:		Pollutant Name:		Pollutant Name:	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
TOTAL:																

☐ Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

* **Other Regulated Pollutant** include Fluorides, Sulfuric Acid Mist, Hydrogen Sulfide (H_2S), Total Reduced Sulfur (including H_2S), Reduced Sulfur Compounds (including H_2S), Municipal Waste Combustor Organics (measured as total tetra-through octa-chlorinated dibenzo-p-dioxins and dibenzofurans), Municipal Waste Combustor Metals (measured as particulate matter), Municipal Waste Combustor Acid Gases (measured as the sum of SO_2 and HCl), and Municipal Solid Waste Landfill Emissions (measured as nonmethane organic compounds).

PROPOSED PERMIT LIMITS FOR GREENHOUSE GASES (GHGs) ON MASS BASIS: FOR PSD MAJOR SOURCES ONLY

Company Name:	Date:	Registration Number:

Unit Ref. No.	Proposed Permit Limits for GHG Pollutants on Mass Basis													
	CO_2 (Carbon Dioxide)		N_2O (Nitrous Oxide)		CH_4 (Methane)		HFCs (Hydrofluoro-carbons)		PFCs (Perfluoro-carbons)		SF_6 (Sulfur Hexafluoride)		Total GHGs	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
TOTAL:														

☐ Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

PROPOSED PERMIT LIMITS FOR GREENHOUSE GASES (GHGs) ON CO_2 EQUIVALENT EMISSIONS (CO_2e) BASIS: FOR PSD MAJOR SOURCES ONLY

Company Name:	Date:	Registration Number:

Unit Ref. No.	Proposed Permit Limits for GHG Pollutants on CO_2 Equivalent Basis													
	CO_2 (Carbon Dioxide)		N_2O (Nitrous Oxide)		CH_4 (Methane)		HFCs (Hydrofluoro-carbons)		PFCs (Perfluoro-carbons)		SF_6 (Sulfur Hexafluoride)		Total GHGs	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
TOTAL:														

☐ Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

BASELINE ACTUAL EMISSIONS (BAE) FOR CRITERIA POLLUTANTS: FOR PSD OR MAJOR NONATTAINMENT SOURCES ONLY

Company Name:	Date:	Registration Number:

Unit Ref. No.	Average Actual Annual Emissions to the Atmosphere of Criteria Pollutants for the Period: _____, 20___ to _____, 20___							
	PM (Particulate Matter)	PM-10* (10 µM or smaller particulate matter)	PM 2.5* (2.5 µM or smaller particulate matter)	SO_2 (Sulfur Dioxide)	NO_X (Nitrogen Oxides)	CO (Carbon Monoxide)	VOC (Volatile Organic Compounds)	Pb (Lead)
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
TOTAL:								

☐ Background Documentation Attached (totals and per Unit Ref. No.)

*** PM-10 and PM 2.5 includes filterable and condensable.**

BASELINE ACTUAL EMISSIONS (BAE) FOR GREENHOUSE GASES (GHGs) POLLUTANT EMISSIONS ON MASS BASIS: FOR PSD MAJOR SOURCES ONLY

Company Name:	Date:	Registration Number:

Unit Ref. No.	Average Actual Annual Emissions to the Atmosphere of GHGs for the Period: _____, 20___ to _____, 20___					
	CO_2 (Carbon Dioxide)	N_2O (Nitrous Oxide)	CH_4 (Methane)	HFCs (Hydrofluorocarbons)	PFCs (Perfluorocarbons)	SF_6 (Sulfur Hexafluoride)
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
TOTAL:						

☐ Background Documentation Attached (totals and per Unit Ref. No.)

BASELINE ACTUAL EMISSIONS (BAE) FOR GREENHOUSE GASES (GHGs) POLLUTANT EMISSIONS ON CO_2 EQUIVALENT EMISSIONS (CO_2e)
BASIS: FOR PSD MAJOR SOURCES ONLY

Company Name:	Date:	Registration Number:

Unit Ref. No.	Average Actual Annual Emissions to the Atmosphere of GHGs for the Period: _____, 20___ to _____, 20___					
	CO_2 (Carbon Dioxide)	N_2O (Nitrous Oxide)	CH_4 (Methane)	HFCs (Hydrofluorocarbons)	PFCs (Perfluorocarbons)	SF_6 (Sulfur Hexafluoride)
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
TOTAL:						

☐ Background Documentation Attached (totals and per Unit Ref. No.)

OPERATING PERIODS:

Company Name: Atlantic Coast Pipeline, LLC	Date: 03/2016	Registration Number: NA

Unit Ref. No.	Percent Annual Use/Throughput by Season				Normal Process/Equipment Operating Schedule			Maximum Process/Equipment Operating Schedule		
	December February	March May	June August	September November	Hours per Day	Days per Week	Weeks per Year	Hours per Day	Days per Week	Weeks per Year
CT-01	25	25	25	25	24	7	52	24	7	52
CT-02	25	25	25	25	24	7	52	24	7	52
CT-03	25	25	25	25	24	7	52	24	7	52
CT-04	25	25	25	25	24	7	52	24	7	52
WH-01	25	25	25	25	24	7	52	24	7	52
LH-01	25	25	25	25	24	7	52	24	7	52
LH-02	25	25	25	25	24	7	52	24	7	52
LH-03	25	25	25	25	24	7	52	24	7	52
LH-04	25	25	25	25	24	7	52	24	7	52
MT-01	25	25	25	25	24	7	52	24	7	52
MT-02	25	25	25	25	24	7	52	24	7	52
MT-03	25	25	25	25	24	7	52	24	7	52
MT-04	25	25	25	25	24	7	52	24	7	52
MT-05	25	25	25	25	24	7	52	24	7	52
MT-06	25	25	25	25	24	7	52	24	7	52
MT-07	25	25	25	25	24	7	52	24	7	52
MT-08	25	25	25	25	24	7	52	24	7	52
MT-09	25	25	25	25	24	7	52	24	7	52
MT-10	25	25	25	25	24	7	52	24	7	52
TK-1	25	25	25	25	24	7	52	24	7	52
TK-2	25	25	25	25	24	7	52	24	7	52
TK-3	25	25	25	25	24	7	52	24	7	52

Maximum Facility Operating Schedule		
Hours per Day	Days per Week	Weeks per Year
24	7	52

ATTACHMENT 2

EQUIPMENT DESIGN DATA

Solar Turbines Emissions Estimates

Titan 130-20502S

Assumptions: pipeline natural gas, sea level, 4"/4" inlet/outlet losses, nominal performance

50% load																
Temp, F	HP	fuel flow, mmbtu/hr LHV	Thermal Eff, %	NOx (ppm)	NOx (lb/hr)	CO (ppm)	CO (lb/hr)	UHC (ppm)	UHC (lb/hr)	VOC (ppm)	VOC (lb/hr)	CO2 lb/hr	PM10/2.5 lb/mmbtu	PM10/2.5 lb/hr	Exhaust Temp (F)	Exhaust Flow (lb/hr)
0	10883	90.71	30.53	9	3.2	25	5.5	25	3.2	2.5	0.3	11896	0.02	2.0	704	334,570
59	10005	105.64	24.10	9	3.8	25	6.4	25	3.7	2.5	0.4	13738	0.02	2.3	992	312,106
100	8135	96.16	21.52	9	3.4	25	5.7	25	3.3	2.5	0.3	12273	0.02	2.1	1051	272535
75% load																
Temp, F	HP	fuel flow, mmbtu/hr LHV	Thermal Eff, %	NOx (ppm)	NOx (lb/hr)	CO (ppm)	CO (lb/hr)	UHC (ppm)	UHC (lb/hr)	VOC (ppm)	VOC (lb/hr)	CO2 lb/hr	PM10/2.5 lb/mmbtu	PM10/2.5 lb/hr	Exhaust Temp (F)	Exhaust Flow (lb/hr)
0	16324	137.74	30.15	9	5.0	25	8.4	25	4.8	2.5	0.5	18019	0.02	3.0	899	412,957
59	15007	124.31	30.72	9	4.4	25	7.5	25	4.3	2.5	0.4	16161	0.02	2.7	955	357,451
100	12202	109.82	28.27	9	3.8	25	6.5	25	3.7	2.5	0.4	14013	0.02	2.4	1019	303557
100% load																
Temp, F	HP	fuel flow, mmbtu/hr LHV	Thermal Eff, %	NOx (ppm)	NOx (lb/hr)	CO (ppm)	CO (lb/hr)	UHC (ppm)	UHC (lb/hr)	VOC (ppm)	VOC (lb/hr)	CO2 lb/hr	PM10/2.5 lb/mmbtu	PM10/2.5 lb/hr	Exhaust Temp (F)	Exhaust Flow (lb/hr)
0	21765	157.33	35.20	9	5.7	25	9.6	25	5.5	2.5	0.6	20565	0.02	3.5	900	437,973
59	20010	142.45	35.74	9	5.1	25	8.6	25	4.9	2.5	0.5	18511	0.02	3.1	944	392,270
100	16269	125.42	33.01	9	4.4	25	7.5	25	4.3	2.5	0.4	16001	0.02	2.8	994	339519

PEERLESS Mfg. Co.

SCR SYSTEM DESIGN DATASHEET

ENQUIRY DETAILS	
Enquiry Number	32237
Revision	0
Date of Revision	01-Sep-2015
Project Name	Atlantic Coast Pipeline
Project Location	ACP-2
Application	Simple Cycle
Number of SCRs	17

PROCESS DATA													
Design Case			Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10	Case 11	Case 12
Customer Design Case			Centaur 40	Centaur 40	Centaur 50L	Centaur 50L	Taurus 60	Taurus 60	Taurus 70	Taurus 70	Mars 100	Mars 100	Titan 130	Titan 130
Percent Load		Percent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Fuel Case		Percent	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
EXHAUST GAS EMISSIONS DATA (BEFORE COOLING)														
Exhaust Gas Mass Flowrate, Wet		lb/h	164994	127403	161184	127484	186880	151704	247255	179824	367228	289445	437956	341228
Exhaust Gas Volumetric Flowrate, Wet		ACFM	87269	73508	91761	80971	107807	96052	139492	112383	207193	177388	254955	215260
Exhaust Gas Temperature		degrees F	779.0	873.0	871.0	1004.0	868.0	999.0	858.0	980.0	859.0	953.0	900.0	993.0
Exhaust Gas Composition														
Component	*MW*													
O2	31.999	vol% (wet)	15.78	15.29	14.80	14.08	14.50	13.93	14.39	13.88	14.73	14.23	14.40	13.69
H2O	18.015	vol% (wet)	4.67	8.15	5.55	9.21	5.81	9.34	5.91	9.39	5.61	9.05	5.90	9.55
N2	28.013	vol% (wet)	76.23	73.41	75.88	73.01	75.78	72.96	75.74	72.93	75.85	73.05	75.75	72.88
CO2	44.010	vol% (wet)	2.41	2.27	2.86	2.83	3.00	2.90	3.05	2.93	2.90	2.76	3.04	3.01
Ar	39.948	vol% (wet)	0.91	0.88	0.91	0.87	0.91	0.87	0.91	0.87	0.91	0.87	0.91	0.87
			100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Emissions from the Source	@ %O2	15												
Reference applicable for ppmvd and mg/Nm3 (dry)														
Nox as NO2		ppmvd	25.00	25.00	9.00	9.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Nox as NO2		lb/h	4.66	3.44	1.95	1.55	3.97	3.16	5.34	3.77	7.51	5.73	9.44	7.38
CO		ppmvd	50.00	50.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
CO		lb/h	5.67	4.19	3.31	2.63	4.02	3.20	5.42	3.83	7.62	5.81	9.58	7.49
SO2		ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO2		lb/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO3		ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO3		lb/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COOLING AIR DATA														
Cooling Air Mass Flowrate, Wet		lb/h	7181.2	27800.1	29270.9	57444.9	38705.3	67013.0	40077.2	73373.3	60074.6	104237.6	98593.9	147099.4
Cooling Air Volumetric Flowrate, Wet		ACFM	1387	6438	5653	13303	7475	15518	7739	16991	11601	24139	19040	34064
Ambient Air Temperature		degrees F	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00	100.00
Relative Humidity		Percent	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
EXHAUST GAS EMISSIONS DATA (AFTER COOLING)														
Exhaust Gas Mass Flowrate, Wet		lb/h	172175	155203	190455	184929	225585	218717	287332	253197	427303	389683	536550	488325
Exhaust Gas Volumetric Flowrate, Wet		ACFM	88898	80938	98384	96292	116559	113920	148553	131945	220785	205195	277243	254464
Exhaust Gas Temperature (after cooling)		degrees F	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00
Exhaust Gas Composition														
Component	*MW*													
O2	31.999	vol% (wet)	15.99	16.15	15.73	15.95	15.59	15.82	15.29	15.68	15.59	15.78	15.59	15.62
H2O	18.015	vol% (wet)	4.48	7.38	4.72	7.55	4.84	7.67	5.11	7.79	4.84	7.70	4.84	7.84
N2	28.013	vol% (wet)	76.30	73.71	76.21	73.65	76.16	73.61	76.05	73.55	76.15	73.59	76.16	73.54
CO2	44.010	vol% (wet)	2.31	1.87	2.43	1.97	2.50	2.03	2.63	2.10	2.50	2.04	2.49	2.12
Ar	39.948	vol% (wet)	0.91	0.88	0.91	0.88	0.91	0.88	0.91	0.88	0.91	0.88	0.91	0.88
			100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Emissions from the Source	@ %O2	15												
Reference applicable for ppmvd and mg/Nm3 (dry)														
Nox as NO2		ppmvd	25.00	25.06	9.00	9.04	15.00	15.07	15.00	15.06	15.00	15.06	15.00	15.06
Nox as NO2		lb/h	4.66	3.44	1.95	1.55	3.97	3.16	5.34	3.77	7.51	5.73	9.44	7.38
CO		ppmvd	50.00	50.13	25.00	25.11	25.00	25.11	25.00	25.10	25.00	25.09	25.00	25.11
CO		lb/h	5.67	4.19	3.31	2.63	4.02	3.20	5.42	3.83	7.62	5.81	9.58	7.49
SO2		ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO2		lb/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO3		ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO3		lb/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Particulates		kg/h	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trace Elements		mg/Nm3 (dry)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VOC		ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Amount of Nox as NO2		Percent	50	50	50	50	50	50	50	50	50	50	50	50
Nox Reduction		Percent	80.00	80.00	44.44	44.44	66.67	66.67	66.67	66.67	66.67	66.67	66.67	66.67
Dilution Air Required		lb/h	327	327	327	327	327	327	327	327	327	327	655	327
Dilution Air Required		SCFM	68	68	68	68	68	68	68	68	68	68	135	68
Aqueous Ammonia Requirement		lb/h	11	8	6	5	10	8	14	10	20	15	25	19
Aqueous Ammonia Requirement		gal/month	1046	772	569	452	989	787	1331	941	1873	1429	2354	1841
Total Mass injected by SCR		lb/h	338	335	333	332	337	335	341	337	347	342	680	346
Exhaust Gas Mass Flowrate, Wet at SCR catalyst		lb/h	172513.1	155538.2	190787.8	185260.6	225922.6	219052.2	287673.0	253534.1	427649.1	394024.5	537229.4	488671.5
Exhaust Gas Vol Flowrate, Wet at SCR Catalyst		ACFM	89073	81113	98556	96465	116734	114095	148729	132120	220965	205373	277594	254645
Performance Warranties	@ %O2	15												
Reference applicable for ppmvd and mg/Nm3 (dry)														
Nox as NO2		ppmvd	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Nox as NO2		lb/h	0.93	0.69	1.09	0.86	1.32	1.05	1.78	1.26	2.50	1.91	3.15	2.46
NH3 Slip		ppmvd	10.00	10.03	10.00	10.04	10.00	10.04	10.00	10.04	10.00	10.04	10.00	10.04
NH3 Slip		lb/h	0.69	0.51	0.60	0.64	0.98	0.78	1.32	0.93	1.85	1.41	2.33	1.82

** VTA = Vendor to Advise*

SITE/AMBIENT CONDITIONS		
Design Ambient Temperature	100	degrees F
Design Ambient Pressure	407	inH2O
Site Elevation	VARIOUS	ft
Gauge Duct Pressure	20.00	inH2O
Relative Humidity	60	Percent

AFCU DESIGN		
Reagent	Aqueous Ammonia	
Reagent Concentration	19.00	%w/w

ATTACHMENT 3

POTENTIAL EMISSION CALCULATIONS

Table C-1 Permit to Construct Application Project Equipment List
ACP Buckingham Compressor Station - Buckingham County, Virginia

Emission Point ID	Source	Manufacturer	Model/Type	Rated Capacity
CT-01	Compressor Turbine	Solar Turbines	Mars 100-16000S	17,574 hp
CT-02	Compressor Turbine	Solar Turbines	Taurus 70-10802S	11,882 hp
CT-03	Compressor Turbine	Solar Turbines	Titan 130-20502S	21,765 hp
CT-04	Compressor Turbine	Solar Turbines	Centaur 50-6200LS	6,642 hp
WH-01	Boiler	TBD	TBD	9.5 MMBtu/hr
LH-01	Line Heater	ETI	WB HTR	17 MMBtu/hr
LH-02	Line Heater	ETI	WB HTR	17 MMBtu/hr
LH-03	Line Heater	ETI	WB HTR	17 MMBtu/hr
LH-04	Line Heater	ETI	WB HTR	17 MMBtu/hr
MT-01	Microturbine	Capstone	C200	200 kW
MT-02	Microturbine	Capstone	C200	200 kW
MT-03	Microturbine	Capstone	C200	200 kW
MT-04	Microturbine	Capstone	C200	200 kW
MT-05	Microturbine	Capstone	C200	200 kW
MT-06	Microturbine	Capstone	C200	200 kW
MT-07	Microturbine	Capstone	C200	200 kW
MT-08	Microturbine	Capstone	C200	200 kW
MT-09	Microturbine	Capstone	C200	200 kW
MT-10	Microturbine	Capstone	C200	200 kW
FUG-01	Fugitive Leaks - Blowdowns	-	-	-
FUG-02	Fugitive Leaks - Piping	-	-	-
TK-1	Accumulator Tank	-	-	2,500 gal
TK-2	Hydrocarbon (Waste Oil) Tank	--	--	2,000 gal
TK-3	Ammonia Tank	--	--	8,000 gal

Table C-2 Potential Emissions From Combustion Sources

ACP Buckingham Compressor Station - Buckingham County, Virginia

Turbine Operational Parameters:

Normal Hours of Operation:	8,677
Hours at Low Load (<50%)	0
Hours of Low Temp. (< 0 deg. F)	50
Hours of Start-up/Shut-down	33.3
Total Hours of Operation (hr/yr):	8,760

Microturbine Operational Hours:

Normal Hours of Operation:	8,760

Boiler/Heater Operational Parameters:

Normal Hours of Operation:	8,760

Pre-Control Potential to Emit

Combustion Sources	Power Rating	Units	Fuel	Criteria Pollutants (tpy)								GHG Emissions (tpy)				Ammonia (tpy)	HAP (tpy)
				NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	NH3	Total HAP
Solar Mars 100 Turbine	17,574	hp	Natural Gas	21.9	35.5	1.97	2.12	3.60	3.60	3.60	8.90	74,298	5.37	1.87	74,991	8.12	0.866
Solar Taurus 70 Turbine	11,882	hp	Natural Gas	14.9	23.8	1.36	1.43	2.42	2.42	2.42	5.99	49,980	3.62	1.26	50,446	5.77	0.583
Solar Titan 130 Turbine	21,765	hp	Natural Gas	26.6	43.1	2.41	2.58	4.36	4.36	4.36	10.8	90,075	6.52	2.27	90,915	10.2	1.05
Solar Centaur 50L Turbine	6,642	hp	Natural Gas	9.25	14.8	0.834	0.894	1.51	1.51	1.51	3.74	31,295	2.26	0.788	31,587	3.58	0.364
Boiler	9.5	MMBtu/hr	Natural Gas	2.04	3.43	0.224	0.024	0.078	0.078	0.078	0.233	4,895	0.094	0.090	4924.38	0.000	0.077
M&R Heater 1 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8812.06	0.000	0.138
M&R Heater 2 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8812.06	0.000	0.138
M&R Heater 3 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8812.06	0.000	0.138
M&R Heater 4 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8812.06	0.000	0.138
MicroTurbine 1 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 2 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 3 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 4 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 5 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 6 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 7 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 8 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 9 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
MicroTurbine 10 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1336.38	0.000	0.003
Total (tons/yr)				**81.9**	**143**	**9.47**	**7.33**	**12.4**	**12.4**	**12.4**	**31.5**	**298,898**	**19.4**	**7.02**	**301,475**	**27.7**	**3.52**

Turbine Control Efficiencies

Control Technology	NOx	CO	VOC
Selective Catalytic Reduction	44%	-	-
Oxidation Catalyst	-	80%	50%

Post-Control Potential to Emit

Combustion Sources	Power Rating	Units	Fuel	Criteria Pollutants (tpy)								GHG Emissions (tpy)				Ammonia (tpy)	HAP (tpy)
				NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	NH3	Total HAP
Solar Mars 100 Turbine	17,574	hp	Natural Gas	12.1	7.09	0.987	2.12	3.60	3.60	3.60	8.90	74,298	5.37	1.87	74,991	8.12	0.866
Solar Taurus 70 Turbine	11,882	hp	Natural Gas	8.25	4.76	0.680	1.43	2.42	2.42	2.42	5.99	49,980	3.62	1.26	50,446	5.77	0.583
Solar Titan 130 Turbine	21,765	hp	Natural Gas	14.8	8.62	1.21	2.58	4.36	4.36	4.36	10.8	90,075	6.52	2.27	90,915	10.2	1.05
Solar Centaur 50L Turbine	6,642	hp	Natural Gas	5.14	2.96	0.417	0.894	1.51	1.51	1.51	3.74	31,295	2.26	0.788	31,587	3.58	0.364
Boiler	9.5	MMBtu/hr	Natural Gas	2.04	3.43	0.224	0.024	0.078	0.078	0.078	0.233	4,895	0.094	0.090	4,924	0.00	0.077
M&R Heater 1 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 2 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 3 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 4 (Woods Corner)	17	MMBtu/hr	Natural Gas	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
MicroTurbine 1 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 2 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 3 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 4 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 5 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 6 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 7 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 8 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 9 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 10 (Woods Corner)	200	KW	Natural Gas	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
Total (tons/yr)				**49.7**	**48.8**	**6.18**	**7.33**	**12.4**	**12.4**	**12.4**	**31.5**	**298,898**	**19.4**	**7.02**	**301,475**	**27.7**	**3.52**

Notes:

(1) Turbine emissions are calculated by the following formula: ER * Run Hours / 2000 * (1 - Control Efficiency)□
ER = Emission Rate for particular equipment and pollutant (lbs/hr)
2000 = the amount of lbs in a ton

(2) MicroTurbine emissions are calculated by the following formula: Power Rating * Run Hours * EF / 1000 / 2000□
Power Rating = Engine kW rating (kW)
EF = Emission Factor from either manufacturer's data or AP-42 (lb/MWh)
2000 = the amount of lbs in a ton
1000 = the amount of kW in a MW

(3) Boiler/Heater emissions calculated by the following formula: EF * Power Rating * Run Hours / HHV / 2000
EF = AP-42 Emission Factor (lb/MMSCF)
Power Rating = Boiler/Heater Heat Capacity (MMBtu/hr)
HHV = Natural Gas High Heating Value (1020 MMBtu/MMSCF)

(4) Turbines are equipped with Selective Catalytic Reduction (SCR) and oxidation catalyst for control of NOx (44%), CO (80%), and VOC (50%)

(5) Boiler assumed to have low-NOx burners

(6) See the "HAP Emissions" worksheet for a more detailed breakdown of HAP emissions

(7) See Emissions Factors table for Emissions Factors for each operating scenario.

(8) Each start-up/shut-down event assumed to last 10 minutes

Table C-3 Event Based Potential Emissions From Combustion Sources
ACP Buckingham Compressor Station - Buckingham County, Virginia

Start-up Emissions

Combustion Sources	Power Rating	Units	Fuel	Start-up Events	Criteria Pollutants (tpy)			GHG Emissions (tpy)		
					NOx	CO	VOC	CO2	CH4	CO2e
Solar Mars 100 Turbine	17,574	hp	Natural Gas	100	0.070	6.18	0.071	41.5	0.284	48.6
Solar Taurus 70 Turbine	11,882	hp	Natural Gas	100	0.040	3.66	0.042	26.0	0.168	30.2
Solar Titan 130 Turbine	21,765	hp	Natural Gas	100	0.095	8.85	0.101	58.1	0.404	68.2
Solar Centaur 50L Turbine	6,642	hp	Natural Gas	100	0.040	3.46	0.040	23.5	0.160	27.5
Total (tons/yr)					0.245	22.1	0.254	149	1.02	174

Shutdown Emissions

Combustion Sources	Power Rating	Units	Fuel	Shutdown Events	Criteria Pollutants (tpy)			GHG Emissions (tpy)		
					NOx	CO	VOC	CO2	CH4	CO2e
Solar Mars 100 Turbine	17,574	hp	Natural Gas	100	0.085	7.46	0.085	46.0	0.340	54.5
Solar Taurus 70 Turbine	11,882	hp	Natural Gas	100	0.055	4.67	0.053	28.8	0.212	34.1
Solar Titan 130 Turbine	21,765	hp	Natural Gas	100	0.120	10.4	0.119	63.6	0.476	75.5
Solar Centaur 50L Turbine	6,642	hp	Natural Gas	100	0.020	1.77	0.020	10.9	0.080	12.9
Total (tons/yr)					0.280	24.3	0.277	149	1.11	177

Total SUSD Emissions (tons/yr)					0.525	46.4	0.531	298	2.12	351

Compressor Blowdown Emissions

Source Designation:	FUG-01

Blowdown Start-up Events

Blowdown from Start-up	38,000	scf/event
Volumetric flow rate	385	scf-lbmol
Methane Molecular Weight	16	lb-lbmol
Methane Percent Weight	93%	%
Start-up Blowdown	1,691	lb/event

Blowdown Shutdown Events

Blowdown from Shutdown	63,000	scf/event
Volumetric flow rate	385	scf-lbmol
Methane Molecular Weight	16	lb-lbmol
Methane Percent Weight	93%	%
Shutdown Blowdown	2,803	lb/event

Gas Composition

Pollutant	Molecular Weight (lb/lb-mol)	Molar (Volume) Fraction (mol%)	Wt. Fraction[1] (wt. %)
Total Stream Molecular Weight	16.89		
Non-VOC			
Carbon Dioxide	44.01	1.041%	2.71%
Nitrogen	28.01	0.994%	1.65%
Methane	16.04	94.21%	89.47%
Ethane	30.07	2.923%	5.20%
VOC			
Propane	44.10	0.546%	1.43%
n-Butane	58.12	0.084%	0.29%
Isobutane	58.12	0.079%	0.27%
n-Pentane	72.15	0.022%	0.09%
Isopentane	72.15	0.024%	0.10%
n-Hexane	78.11	0.032%	0.15%
n-Heptane	100.21	0.049%	0.29%
Total VOC Fraction			2.62%
Total HAP Fraction			0.15%

Blowdown from Startup Events

Combustion Sources	Start-up Events	VOC	GHG Emissions (tpy)			HAPs
			CO2	CH4	CO2e	
Solar Mars 100 Turbine	100	2.22	2.29	75.6	1,893	0.125
Solar Taurus 70 Turbine	100	2.22	2.29	75.6	1,893	0.125
Solar Titan 130 Turbine	100	2.22	2.29	75.6	1,893	0.125
Solar Centaur 50L Turbine	100	2.22	2.29	75.6	1,893	0.125
Total (tons/yr)		8.87	9.17	303	7,573	0.500

Blowdown from Shutdown Events

Combustion Sources	Startup Events	VOC	GHG Emissions (tpy)			HAPs
			CO2	CH4	CO2e	
Solar Mars 100 Turbine	100	3.67	3.80	125	3,139	0.207
Solar Taurus 70 Turbine	100	3.67	3.80	125	3,139	0.207
Solar Titan 130 Turbine	100	3.67	3.80	125	3,139	0.207
Solar Centaur 50L Turbine	100	3.67	3.80	125	3,139	0.207
Total (tons/yr)		14.7	15.2	502	12,555	0.830

Site-Wide Blowdown Events

Site-Wide Blowdown	2,000,000	scf/event
Volumetric flow rate	385	scf-lbmol
Methane Molecular Weight	16	lb-lbmol
Methane Percent Weight	93%	%
Site-Wide Blowdown	88,990	lb/event

Blowdown from Site Wide Events

Combustion Sources	Startup Events	VOC	GHG Emissions (tpy)			HAPs
			CO2	CH4	CO2e	
ACP-2	1	1.17	1.21	39.8	996	0.066
Total (tons/yr)		1.17	1.21	39.8	996	0.066

Total Blowdown Emissions (tons/yr)		24.7	25.6	844	21,124	1.40

Table C-4 Combustion Source Criteria Pollutant Emission Factors
ACP Buckingham Compressor Station - Buckingham County, Virginia

Solar Turbine Normal Operation Emission Factors (lb/hr)															
Equipment Name	Fuel	Units	NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	NH3
Solar Centaur 50L Turbine	Natural Gas	lb/hr	1.98	3.30	0.190	0.204	0.345	0.345	0.345	0.855	7,145	0.516	0.180	7,212	0.818
Solar Taurus 70 Turbine	Natural Gas	lb/hr	3.18	5.30	0.310	0.326	0.553	0.553	0.553	1.37	11,411	0.826	0.288	11,517	1.32
Solar Mars 100 Turbine	Natural Gas	lb/hr	4.68	7.90	0.450	0.485	0.821	0.821	0.821	2.03	16,963	1.23	0.428	17,121	1.85
Solar Titan 130 Turbine	Natural Gas	lb/hr	5.70	9.60	0.550	0.588	1.00	1.00	1.00	2.46	20,565	1.49	0.519	20,757	2.33

Notes
(1) Pre-Control Emission Rates for NOx, CO, VOC, PMF, PMC, and CO2 taken from Solar Turbine Data at 100% load and 0 degrees F
(2) Emission Factors for SO2, CH4, N2O taken from AP-42 in (lbs/MMBtu) and multiplied by turbine fuel throughput by Solar Turbine at 100% load and 0 degree F to get Emission Rates
(3) Assume PMF=PMF-10=PMF-2.5; Filterable and Condensable based on Solar Turbine Emission Factor and ratio of AP-42 Table 3.1 factors
(4) NH3 emission rates based on a 10 ppm ammonia slip from the SCR based on manufacturer information
(5) CO2e emission rate calculated by multiplying each GHG (CO2, CH4, N2O) by its Global Warming Potential (GWP) and adding them together
(6) CO2 GWP = 1; CH4 GWP = 25; N2O GWP = 298 [40 CFR Part 98]

Solar Turbine Alternate Operation Emission Factors (lb/hr)								
			< 0 degrees F			Solar Turbine Low Load F		
Equipment Name	Fuel	Units	NOx	CO	VOC	NOx	CO	VOC
Solar Centaur 50L Turbine	Natural Gas	lb/hr	26.4	19.8	0.380	15.4	1,320	7.60
Solar Taurus 70 Turbine	Natural Gas	lb/hr	42.4	31.8	0.620	24.7	2,120	12.4
Solar Mars 100 Turbine	Natural Gas	lb/hr	62.4	47.4	0.900	36.4	3,160	18.0
Solar Titan 130 Turbine	Natural Gas	lb/hr	76.0	57.6	1.10	44.3	3,840	22.0

Notes
(1) Pre-Control low temperature Emission Rates for NOx, CO, VOC. Conservatively assume 120 ppm NOx, 150 ppm CO, and 5 ppm VOC (10% of UHC) per Table 2 of Solar PIL 167
(2) Pre-Control low load Emission Rates for NOx, CO, VOC. Conservatively assume 70 ppm NOx, 10,000 ppm CO, and 100 ppm VOC (10% of UHC) per Table 4 of Solar PIL 167

Solar Turbine Start-up and Shutdown Emission Factors (lb/event)														
			Start-up EFs						Shutdown Efs					
Equipment Name	Fuel	Units	NOx	CO	VOC	CO2	CH4	CO2e	NOx	CO	VOC	CO2	CH4	CO2e
Solar Centaur 50L Turbine	Natural Gas	lb/event	0.8	69.1	0.8	469	3.2	549	0.4	35.4	0.4	217	1.6	257
Solar Taurus 70 Turbine	Natural Gas	lb/event	0.8	73.1	0.8	519	3.4	603	1.1	93.4	1.1	575	4.2	681
Solar Mars 100 Turbine	Natural Gas	lb/event	1.4	123.5	1.4	829	5.7	971	1.7	149.2	1.7	920	6.8	1090
Solar Titan 130 Turbine	Natural Gas	lb/event	1.9	176.9	2.0	1,161	8.1	1,363	2.4	207.6	2.4	1,272	9.5	1,510

Notes
(1) Start-up and Shutdown Emissions based on Solar Turbines Incorporated Product Information Letter 170: Emission Estimates at Start-up, Shutdown, and Commissioning for SoLoNOx Combustion Products (13 June 2012). Emission Estimates do not include SO2, PM, N2O, or any HAPs.
(2) VOCs assumed to be 20% of UHC and CH4 assumed to be 80% of UHC.
(3) CO2e emission rate calculated by multiplying each GHG (CO2, CH4) by its Global Warming Potential (GWP) and adding them together
(4) CO2 GWP = 1; CH4 GWP = 25; [40 CFR Part 98]

Engine and Boiler Emission Factors															
Equipment Type	Fuel	Units	NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	NH3
Boiler < 100 MMBtu	Natural Gas	lb/MMscf	50	84	5.5	0.6	1.9	1.9	1.9	5.7	120,000	2.3	2.2	120,713	0.000
Space & Water Heaters	Natural Gas	lb/MMscf	100	84	5.5	0.6	1.9	1.9	1.9	5.7	120,000	2.3	2.2	120,713	0.000
M&R Line Heater	Natural Gas	lb/MMscf	11.2	37.7	6.12	0.6	1.44	1.44	1.44	5.7	120,000	2.3	2.2	120,713	0.000
Capstone Microturbine	Natural Gas	lb/MWh	0.46	1.25	0.1	0.012	0.006	0.006	0.006	0.016	1,520	0.1	0.010	1,526	0.000

Notes
(1) NOx, CO, VOC, and PMF-10 Emission Factors for Boilers < 100 MMBtu from ETI Combustion Analysis June 2015
(2) All other emission factors for natural gas boilers taken from AP-42 Tables 1.4-1 & 1.4-2
(3) Emission Factors for Space & Water Heaters taken from AP-42 Tables 1.4-1 & 1.4-2
(4) NOx, CO, VOC, CO2, and CH4 emission factors for Capstone Microturbine taken from Capstone Manufacturer data
(5) SO2, PMF, PMF-10, PMF-2.5, PMC, and N2O Emission factors for Capstone Turbines taken from AP-42 Table 3.1-2a and converted using 1 KWh = 3412 Btu
(6) NOx, CO, VOC, and PMF emission factors for Line Heaters from Manufacturer's data and convered to lb/MMscf using 1020 MMBtu/MMscf
(7) SO2, PMC, CO2, CH4, and N2O emission factors for Line Heaters from AP-42 Tables 1.4-1 & 1.4-2
(8) Assume PMF=PMF-10=PMF-2.5
(9) CO2e emission rate calculated by multiplying each GHG (CO2, CH4, N2O) by its Global Warming Potential (GWP) and adding them together
(10) CO2 GWP = 1; CH4 GWP = 25; N2O GWP = 298 [40 CFR 98]

Table C-5 Hazardous Air Pollutant (HAP) Emissions From Combustion Sources
ACP Buckingham Compressor Station - Buckingham County, Virginia

Annual HAP Emissions (lb/yr)								
Quantity @ ACP-2		1	1	1	1	1	4	10
Pollutant	HAP?	Solar Centaur 50L Turbine	Solar Titan 130 Turbine	Solar Taurus 70 Turbine	Solar Mars 100 Turbine	Boiler < 100 MMBtu	M&R Line Heater	Capstone Microturbine
1,1,2,2-Tetrachloroethane	Yes							
1,1,2-Trichloroethane	Yes							
1,1-Dichloroethane	Yes							
1,2,3-Trimethylbenzene	No							
1,2,4-Trimethylbenzene	No							
1,2-Dichloroethane	Yes							
1,2-Dichloropropane	Yes							
1,3,5-Trimethylbenzene	No							
1,3-Butadiene	Yes							0.003
1,3-Dichloropropene	Yes							
2,2,4-Trimethylpentane	Yes							
2-Methylnaphthalene	No					0.002	0.004	
3-Methylchloranthrene	No					0.000	0.000	
7,12-Dimethylbenz(a)anthracene	No					0.001	0.002	
Acenaphthene	No					0.000	0.000	
Acenaphthylene	No					0.000	0.000	
Acetaldehyde	Yes							0.239
Acrolein	Yes							0.038
Anthracene	No					0.000	0.000	
Benz(a)anthracene	No					0.000	0.000	
Benzene	Yes					0.171	0.307	0.072
Benzo(a)pyrene	No					0.000	0.000	
Benzo(b)fluoranthene	No					0.000	0.000	
Benzo(e)pyrene	No							
Benzo(g,h,i)perylene	No					0.000	0.000	
Benzo(k)fluoranthene	No					0.000	0.000	
Biphenyl	Yes							
Butane	No					171.335	306.600	
Butyr/Isobutyraldehyde	No							
Carbon Tetrachloride	Yes							
Chlorobenzene	Yes							
Chloroethane	Yes							
Chloroform	Yes							
Chrysene	No					0.000	0.000	
Cyclohexane	No							
Cyclopentane	No							
Dibenzo(a,h)anthracene	No					0.000	0.000	
Dichlorobenzene	Yes					0.098	0.175	
Ethane	No					252.924	452.600	
Ethylbenzene	Yes							0.191
Ethylene Dibromide	Yes							
Fluoranthene	No					0.000	0.000	
Fluorene	No					0.000	0.000	
Formaldehyde	Yes	688.116	1984.624	1100.859	1635.331	6.119	10.950	4.244
Hexane (or n-Hexane)	Yes					146.859	262.800	
Indeno(1,2,3-c,d)pyrene	No					0.000	0.000	
Isobutane	No							
Methanol	Yes							
Methylcyclohexane	No							
Methylene Chloride	Yes							
n-Nonane	No							
n-Octane	No							
Naphthalene	Yes					0.050	0.089	0.008
PAH	Yes							0.013
Pentane (or n-Pentane)	No					212.129	379.600	
Perylene	No							
Phenanthrene	No					0.001	0.002	
Phenol	Yes							
Propane	No					130.541	233.600	
Propylene Oxide	Yes							0.173
Pyrene	No					0.000	0.001	
Styrene	Yes							
Tetrachloroethane	No							
Toluene	Yes					0.277	0.496	0.777
Vinyl Chloride	Yes							
Xylene	Yes							0.383

Table C-5 Hazardous Air Pollutant (HAP) Emissions From Combustion Sources
ACP Buckingham Compressor Station - Buckingham County, Virginia

Annual HAP Emissions (lb/yr)								
Quantity @ ACP-2		1	1	1	1	1	4	10
Pollutant	HAP?	Solar Centaur 50L Turbine	Solar Titan 130 Turbine	Solar Taurus 70 Turbine	Solar Mars 100 Turbine	Boiler < 100 MMBtu	M&R Line Heater	Capstone Microturbine
Arsenic	Yes					0.016	0.029	
Barium	No					0.359	0.642	
Beryllium	Yes					0.001	0.002	
Cadmium	Yes					0.090	0.161	
Chromium	Yes					0.114	0.204	
Cobalt	Yes					0.007	0.012	
Copper	No					0.069	0.124	
Manganese	Yes					0.031	0.055	
Mercury	Yes					0.021	0.038	
Molybdenum	No					0.090	0.161	
Nickel	Yes					0.171	0.307	
Selenium	Yes					0.002	0.004	
Vanadium	No					0.188	0.336	
Zinc	No					2.366	4.234	
Lead	Yes					0.041	0.073	
Total HAPs		728.733	2101.771	1165.840	1731.861			
Total HAP/unit (lb/yr)		729	2,102	1,166	1,732	154	276	6.14
Total HAP/unit (TPY)		0.364	1.05	0.583	0.866	0.077	0.138	0.003

Hazardous Air Pollutant

Notes:
(1) Emissions above are on a per unit basis
(2) Heat rates for Solar Turbines taken from Solar Datasheets
(3) Solar turbines have a 50% HAP control efficiency due to the Oxidation Catalyst

Table C-6 Combustion Source HAP Emission Factors
ACP Buckingham Compressor Station - Buckingham County, Virginia

Pollutant	HAP?	Emission Factors					
		Solar Centaur 50L Turbine	Solar Titan 130 Turbine	Solar Taurus 70 Turbine	Solar Mars 100 Turbine	Boiler/Line Heater < 100 MMBtu	Capstone Microturbine
		lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMscf	lb/kW-hr
1,1,2,2-Tetrachloroethane	Yes						
1,1,2-Trichloroethane	Yes						
1,1-Dichloroethane	Yes						
1,2,3-Trimethylbenzene	No						
1,2,4-Trimethylbenzene	No						
1,2-Dichloroethane	Yes						
1,2-Dichloropropane	Yes						
1,3,5-Trimethylbenzene	No						
1,3-Butadiene	Yes						1.5E-09
1,3-Dichloropropene	Yes						
2,2,4-Trimethylpentane	Yes						
2-Methylnaphthalene	No					2.4E-05	
3-Methylchloranthrene	No					1.8E-06	
7,12-Dimethylbenz(a)anthracene	No					1.6E-05	
Acenaphthene	No					1.8E-06	
Acenaphthylene	No					1.8E-06	
Acetaldehyde	Yes						1.4E-07
Acrolein	Yes						2.2E-08
Anthracene	No					2.4E-06	
Benz(a)anthracene	No					1.8E-06	
Benzene	Yes					2.1E-03	4.1E-08
Benzo(a)pyrene	No					1.2E-06	
Benzo(b)fluoranthene	No					1.8E-06	
Benzo(e)pyrene	No						
Benzo(g,h,i)perylene	No					1.2E-06	
Benzo(k)fluoranthene	No					1.8E-06	
Biphenyl	Yes						
Butane	No					2.1E+00	
Butyr/Isobutyraldehyde	No						
Carbon Tetrachloride	Yes						
Chlorobenzene	Yes						
Chloroethane	Yes						
Chloroform	Yes						
Chrysene	No					1.8E-06	
Cyclohexane	No						
Cyclopentane	No						
Dibenzo(a,h)anthracene	No					1.2E-06	
Dichlorobenzene	Yes					1.2E-03	
Ethane	No					3.1E+00	
Ethylbenzene	Yes						1.1E-07
Ethylene Dibromide	Yes						
Fluoranthene	No					3.0E-06	
Fluorene	No					2.8E-06	
Formaldehyde	Yes	2.9E-03	2.9E-03	2.9E-03	2.9E-03	7.5E-02	2.4E-06
Hexane (or n-Hexane)	Yes					1.8E+00	
Indeno(1,2,3-c,d)pyrene	No					1.8E-06	
Isobutane	No						
Methanol	Yes						
Methylcyclohexane	No						
Methylene Chloride	Yes						
n-Nonane	No						
n-Octane	No						
Naphthalene	Yes					6.1E-04	4.4E-09
PAH	Yes						7.5E-09
Pentane (or n-Pentane)	No					2.6E+00	
Perylene	No						
Phenanthrene	No					1.7E-05	
Phenol	Yes						
Propane	No					1.6E+00	
Propylene Oxide	Yes						9.9E-08
Pyrene	No					5.0E-06	
Styrene	Yes						
Tetrachloroethane	No						
Toluene	Yes					3.4E-03	4.4E-07
Vinyl Chloride+A32	Yes						
Xylene	Yes						2.2E-07

Table C-6 Combustion Source HAP Emission Factors

ACP Buckingham Compressor Station - Buckingham County, Virginia

Pollutant	HAP?	Emission Factors					
		Solar Centaur 50L Turbine	Solar Titan 130 Turbine	Solar Taurus 70 Turbine	Solar Mars 100 Turbine	Boiler/Line Heater < 100 MMBtu	Capstone Microturbine
		lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/MMscf	lb/kW-hr
Arsenic	Yes					2.0E-04	
Barium	No					4.4E-03	
Beryllium	Yes					1.2E-05	
Cadmium	Yes					1.1E-03	
Chromium	Yes					1.4E-03	
Cobalt	Yes					8.4E-05	
Copper	No					8.5E-04	
Manganese	Yes					3.8E-04	
Mercury	Yes					2.6E-04	
Molybdenum	No					1.1E-03	
Nickel	Yes					2.1E-03	
Selenium	Yes					2.4E-05	
Vanadium	No					2.3E-03	
Zinc	No					2.9E-02	
Lead	Yes					5.0E-04	
Total Haps		3.1E-03	3.1E-03	3.1E-03	3.1E-03		

Hazardous Air Pollutant

Notes:

(1) Emission factors for Solar and Capstone natural gas turbines from AP-42 Table 3.1-3

(2) Emission factors for natural gas boilers from AP-42 Tables 1.4-2, 1.4-3, and 1.4-4

(3) Emission factors for Solar natural gas turbines and Caterpillar natural gas emergency generators converted using 1 KWh = 3412 Btu and 1 kw = 1.341 hp

(4) Emission factors for Capstone natural gas turbines converted using 1 KWh = 3412 Btu

(5) Emission Factors (lb/MMBtu) for Formaldehyde and Total HAPs for Solar Turbines from Solar PIL 168

Table C-7 Potential Emissions From Fugitive Leaks

ACP Buckingham Compressor Station - Buckingham County, Virginia

Fugitive Emissions (FUG)

Source Designation:	FUG-02

Operational Parameters:

Annual Hours of Operation (hr/yr):	8,760

Pipeline Natural Gas Fugitive Emissions

Equipment	Service	Emission Factor[1]	Source Count[2]	Total HC Potential Emissions		VOC Weight Fraction	VOC Emissions	CO_2 Weight Fraction	CO_2 Emissions	CH_4 Weight Fraction	CH_4 Emissions	HAP Weight Fraction	HAP Emissions
		kg/hr/source		lb/hr	tpy		tpy		tpy		tpy		tpy
Valves	Gas	4.50E-03	755	7.49	32.8	0.026	0.860	0.027	0.890	0.895	29.4	1.48E-03	0.049
Pump Seals	Gas	2.40E-03		0.000	0.000	0.026	0.000	0.027	0.000	0.895	0.000	1.48E-03	0.000
Others (compressors and others)	Gas	8.80E-03	4	0.078	0.340	0.026	0.009	0.027	0.009	0.895	0.304	1.48E-03	0.001
Connectors	Gas	2.00E-04	4	0.002	0.008	0.026	2.03E-04	0.027	2.10E-04	0.895	0.007	1.48E-03	1.14E-05
Flanges	Gas	3.90E-04	509	0.438	1.92	0.026	0.050	0.027	0.052	0.895	1.71	1.48E-03	0.003
Open-ended lines	Gas	2.00E-03		0.000	0.000	0.026	0.000	0.027	0.000	0.895	0.000	1.48E-03	0.000
			Total	8.01	35.1	-	0.919	-	0.951	-	31.4	-	0.052

1. EPA Protocol for Equipment Leaks Emissions Estimate (EPA-453/R-95-017) Table 2-4: Oil and Gas Production Operations Emission Factors.
2. Component count based on Basic Systems Engineering Estimate.
3. Source count for fugitive emissions includes equipment from ACP-2 and the Woods Corner M&R station.

Equations:

Potential Emissions (lb/hr) = Emission Factor (kg/hr/source) * Source Count * (2.20462 lb/1 kg)

Potential Emissions (tons/yr) = $(lb/hr)_{Potential}$ × Hours of Operation (hr/yr) × (1 ton/2,000 lb)

Table C-8 Tank Emissions

ACP Buckingham Compressor Station - Buckingham County, Virginia

Source Designation:	TK-1, TK-2, TK-3

Tank Parameters

Source	Type of Tank	Contents	Capacity	Throughput	Tank Diam.	Tank Length	Paint Color	Paint Condition
			(gal)	gal/yr	ft	ft		
TK-1	Horizontal, fixed	Produced Fluids	2,500	12,500	4.61	20	Light Grey	Good
TK-2	Horizontal, fixed	Lube Oil	2,000	10,000	4.12	10	Light Grey	Good

Total Emissions

Source	VOC Emissions							
	Flashing Losses		Working Losses		Breathing Losses		Total Losses	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TK-1[1]	--	--	--	--	--	--	0.080	0.350
TK-2[2]	NA	NA	1.03E-06	4.50E-06	2.98E-06	1.31E-05	4.01E-06	1.76E-05

1. Losses were calculated for TK-1 using E&P Tanks Software. See attached for output.
2. Losses were calculated for TK-2 using EPA's TANKS 4.09d software with default breather vent settings.
3. Losses (Emissions) from TK-3 8,000-gallon Ammonia tank assumed to be insignficant.

Table C-9 Project Potential Emissions

ACP Buckingham Compressor Station - Buckingham County, Virginia

Combustion Sources	ID	Criteria Pollutants (tpy)								GHG Emissions (tpy)				Ammonia (tpy)	HAP (tpy)
		NOx	CO	VOC	SO2	PMF	PMF-10	PMF-2.5	PMC	CO2	CH4	N2O	CO2e	NH3	Total HAP
Solar Mars 100 Turbine	CT-01	12.3	20.7	1.14	2.12	3.60	3.60	3.60	8.90	74,385	6.00	1.87	75,094	8.12	0.866
Solar Taurus 70 Turbine	CT-02	8.35	13.1	0.775	1.43	2.42	2.42	2.42	5.99	50,035	4.00	1.26	50,511	5.77	0.583
Solar Titan 130 Turbine	CT-03	15.0	27.8	1.43	2.58	4.36	4.36	4.36	10.8	90,196	7.40	2.27	91,059	10.2	1.05
Solar Centaur 50L Turbine	CT-04	5.20	8.19	0.477	0.894	1.51	1.51	1.51	3.74	31,329	2.50	0.788	31,627	3.58	0.364
Boiler	WH-01	2.04	3.43	0.224	0.024	0.078	0.078	0.078	0.233	4,895	0.094	0.090	4,924	0.00	0.077
M&R Heater 1 (Woods Corner)	LH-01	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 2 (Woods Corner)	LH-02	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 3 (Woods Corner)	LH-03	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
M&R Heater 4 (Woods Corner)	LH-04	0.819	2.76	0.447	0.044	0.105	0.105	0.105	0.416	8,760	0.168	0.161	8,812	0.00	0.138
MicroTurbine 1 (Woods Corner)	MT-01	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 2 (Woods Corner)	MT-02	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 3 (Woods Corner)	MT-03	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 4 (Woods Corner)	MT-04	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 5 (Woods Corner)	MT-05	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 6 (Woods Corner)	MT-06	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 7 (Woods Corner)	MT-07	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 8 (Woods Corner)	MT-08	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 9 (Woods Corner)	MT-09	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
MicroTurbine 10 (Woods Corner)	MT-10	0.403	1.10	0.088	0.010	0.006	0.006	0.006	0.014	1,332	0.088	0.009	1,336	0.00	0.003
Fugitive Leaks - Blowdowns	FUG-01	-	-	24.7	-	-	-	-	-	25.6	844		21,124	-	1.40
Fugitive Leaks - Piping	FUG-02	-	-	0.919	-	-	-	-	-	0.951	31.4	-	785	-	0.052
Accumulator Tank	TK-1	-	-	0.350	-	-	-	-	-	-	-	-	-	-	-
Hydrocarbon (Waste Oil) Tank	TK-2	-	-	1.76E-05	-	-	-	-	-	-	-	-	-	-	-
Total (tons/yr)		**50.2**	**95.2**	**32.7**	**7.33**	**12.4**	**12.4**	**12.4**	**31.5**	**299,223**	**897**	**7.02**	**323,736**	**27.7**	**4.97**

ATTACHMENT 4

SITE PLAN

Attachment 4 – Site Plan – Buckingham Site Layout –

CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION

FILED UNDER SEPARATE COVER