Permit Application for Stationary Sources of Air Pollution

New Source Review

CPV Towantic, LLC

September 2014

Prepared for:

CPV Towantic, LLC
50 Braintree Hill Office Park, Suite 300
Braintree, MA 02184

For Submittal to:

Connecticut Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106

Prepared by:

Tetra Tech, Inc.
238 Littleton Road, Suite 201B
Westford, MA 01886

TETRA TECH

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ºF	degrees Fahrenheit
%	percent
ACC	air cooled condenser
BACT	Best Available Control Technology
Bhp	brake horsepower
Btu/kW-hr	British thermal unit per kilowatt-hour
CARB	California Air Resources Board
CCS	carbon capture and storage
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CPV Towantic	CPV Towantic, LLC
CT#1	combustion turbine #1
CT#2	combustion turbine #2
CTG	combustion turbine generator
DB#1	duct burner #1
DB#2	duct burner #2
DEEP	Connecticut Department of Energy and Environmental Protection
EAB	Environmental Appeals Board
GE	General Electric
GHG	greenhouse gases
g/bhp	grams per break-horse power hour
g/kW-hr	grams per kilowatt-hour
gr S/100 scf	grains of sulfur per 100 standard cubic feet
H_2SO_4	sulfuric acid
HAP	hazardous air pollutant
HFCs	hydrofluorocarbons
HHV	higher heating value
HRSG	heat recovery steam generator
IGCC	Integrated Gasification Combined-Cycle
ISO	International Organization for Standardization
kW	kilowatt

Acronyms/Abbreviations	Definition
LAER	Lowest Achievable Emission Rate
lb/MMBtu	pound per million British thermal units
lb/MW-hr	pound per megawatt-hour
lb/hr	pounds per hour
lbs	pounds
LLO	Low Load Operation
LNB	low NO_x burner
MACT	Maximum Achievable Control Technology
MASC	Maximum Allowable Stack Concentration
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MW	megawatt
MWh	megawatt-hour
NETL	National Energy Technology Laboratory
NESHAP	National Emission Standard for Hazardous Air Pollutants
NH_3	ammonia
NO_x	nitrogen oxides
NNSR	Non-Attainment New Source Review
NSPS	New Source Performance Standards
NSR	New Source Review
NSR Manual	*New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting*
O_2	oxygen
O_3	ozone
Pb	lead
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
ppm	parts per million
ppmvd	parts per million volume dry
the Project	A nominal 805-megawatt combined-cycle generating facility located on Woodruff Hill Road in Oxford, Connecticut
PSD	Prevention of Significant Deterioration
RACT	Reasonably Achievable Control Technology
RBLC	RACT/BACT/LAER Clearinghouse

Acronyms/Abbreviations	Definition
SCR	selective catalytic reduction
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_3	sulfur trioxide
STG	steam turbine generator
SU/SD	start-up/shutdown
tpy	tons per year
ULSD	ultra low sulfur distillate
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VOC	volatile organic compound

PERMIT APPLICATION FOR STATIONARY SOURCES OF AIR POLLUTION

Provided on the following pages is a completed Permit Application for Stationary Sources of Air Pollution Form (DEEP-NSR-APP-200).

Connecticut Department of
Energy & Environmental Protection
Bureau of Air Management
Engineering & Enforcement Division

CPPU USE ONLY
App No.:________________________
Doc No.:________________________
Check No.:______________________
Program: Air Engineering

Permit Application for Stationary Sources of Air Pollution - New Source Review

Please complete this form in accordance with the instructions (DEEP-NSR-INST-200) to ensure the proper handling of your application. Print or type unless otherwise noted. You must submit the permit application fee(s), a copy of the published notice of permit application, and the completed *Certification of Notice Form* (DEEP-APP-005A) along with this form.

Note: If you are applying for a *minor modification* or a *revision* to an existing New Source Review permit, please use the appropriate *Minor Modification Application Form* (DEEP–NSR-APP-200MM) or *Revision Application Form* (DEEP-NSR-APP-200R).

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Applicant Name:	CPV Towantic, LLC	Town Where Site is Located:	Oxford, CT

Part I: Application and Source Type Summary

More than one permit may be applied for using one application form if the sources are located at the same premises. Complete and attach the appropriate supplemental application forms for each unit included in this application package. *Each* unit or process line requires a separate permit.

Unit No.	Source Type	Application Type	Existing Permit or Registration No. (If applicable)	DEEP Use Only	
				Application No.	Permit No.
CT1	Combustion Turbine #1	☒ *New* ☐ *Non-Minor Mod*			
CT2	Combustion Turbine #2	☒ *New* ☐ *Non-Minor Mod*			
DB1	Duct Burner #1	☒ *New* ☐ *Non-Minor Mod*			
DB2	Duct Burner #2	☒ *New* ☐ *Non-Minor Mod*			
AB	Auxliary Boiler	☒ *New* ☐ *Non-Minor Mod*			
EG	Emergency Generator Engine	☒ *New* ☐ *Non-Minor Mod*			

☒ **Check here if additional sheets are necessary to identify all sources that are included in this application package, and label and attach them to this sheet.**

Brief Description of Project:	Combined cycle combusiton turbine electric power generating plant firing natural gas as the primary fuel with ultra low sulfur diesel fuel as backup. Supplemental firing of the HRSGs with natural gas fired duct burners will be conducted.

Connecticut Department of
Energy & Environmental Protection
Bureau of Air Management
Engineering & Enforcement Division

CPPU USE ONLY
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Doc No.:________________________
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Applicant Name:	**CPV Towantic, LLC**	**Town Where Site is Located:**	**Oxford, CT**

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Unit No.	Source Type	Application Type	Existing Permit or Registration No. (If applicable)	DEEP Use Only	
				Application No.	Permit No.
FP	**Emergency Fire Pump Engine**	☒ *New* ☐ *Non-Minor Mod*			
		☐ *New* ☐ *Non-Minor Mod*			
		☐ *New* ☐ *Non-Minor Mod*			
		☐ *New* ☐ *Non-Minor Mod*			
		☐ *New* ☐ *Non-Minor Mod*			
		☐ *New* ☐ *Non-Minor Mod*			

☐ **Check here if additional sheets are necessary to identify all sources that are included in this application package, and label and attach them to this sheet.**

Brief Description of Project:	**Combined cycle combusiton turbine electric power generating plant firing natural gas as the primary fuel with ultra low sulfur diesel fuel as backup. Supplemental firing of the HRSGs with natural gas fired duct burners will be conducted.**

Part II: Fee & Public Notice Information

1. FEE INFORMATION		
A permit application fee of $940.00 [#195] is to be submitted with this application form for ***each*** source listed in Part II. For municipalities, as defined in CGS section 22a-170, a 50% reduction applies. The application will not be processed until the application fee is received. The fee shall be paid by check or money order to the Department of Energy and Environmental Protection or by such other method as the commissioner may allow. The permit fee(s) will be calculated subject to the provisions of RCSA section 22a-174-26 and billed at a later date.	**Number of Sources from Part I**	**7**
	Application Fee per source	**$940**
	Municipality	☒ No ☐ Yes, 50% disc.
	Total Enclosed	**$6,580**
2. PUBLIC NOTICE INFORMATION		
The public notice of application must be published ***prior*** to submitting an application, as required in CGS section 22a-6g. A copy of the public notice of application and the completed *Certification of Notice Form* (DEEP-APP-005A) must be included as Attachment AA to this application. Your application will ***not*** be processed if Attachment AA is not included.	**Date of Publication**	**08/15/2014**

Part III: Applicant Information

- ***If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, the applicant's name shall be stated **exactly** as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of State's database (CONCORD). **(www.concord-sots.ct.gov/CONCORD/index.jsp)***

- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

- *If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the Request to Change Company/Individual Information to the address indicated on the form. If there is a change in name of the entity holding a DEEP license or a change in ownership, contact the Office of Planning and Program Development (OPPD) at 860-424-3003. For any other changes you must contact the specific program from which you hold a current DEEP license.*

1. APPLICANT INFORMATION					
Applicant Name	**CPV Towantic, LLC c/o Competitive Power Ventures, Inc.** Check at least one: ☒ equipment owner ☐ equipment operator *The applicant must be either the owner or operator of the equipment.*				
Mailing Address	**50 Braintree Hill Office Park, Suite 300**				
City/Town	**Braintree**	**State**	**MA**	**Zip Code**	**02184**
Business Phone No.	**(781) 848-3611**	**Extension No.**			
Contact Person	**Andrew Bazinet**				
Title	**Director of Development**				
Email	**abazinet@cpv.com** By providing this e-mail address you are agreeing to receive official correspondence from DEEP, at this electronic address, concerning the subject application. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify DEEP if your e-mail address changes.				

Part III: Applicant Information (continued)

<table>
<tr><td rowspan="4">Applicant Type</td><td colspan="3">☒ business entity ☐ municipality ☐ individual
☐ federal agency ☐ state agency ☐ tribal</td></tr>
<tr><td rowspan="3">If a business entity:</td><td>Business Type</td><td>☐ corporation ☒ limited liability company
☐ limited partnership ☐ limited liability partnership
☐ statutory trust ☐ Other:</td></tr>
<tr><td>Secretary of the State business ID No.</td><td>0606312
☐ Check here if your business is NOT registered with the Secretary of State's office.</td></tr>
<tr><td colspan="2">This information can be accessed at the Secretary of State's database (CONCORD).
(www.concord-sots.ct.gov/CONCORD/index.jsp)</td></tr>
<tr><td>Applicant's interest in property at which the proposed activity is to be located</td><td colspan="3">☒ site owner ☐ option holder ☐ lessee
☐ easement holder
☐ Other:</td></tr>
<tr><td>Are there co-applicants?</td><td colspan="3">☐ Yes ☒ No
If "Yes", attach additional sheet(s) with the required information as above.</td></tr>
<tr><td>Did the Applicant attend a Pre-Application Meeting or an Application Review Meeting with DEEP air staff?
(check all that apply)</td><td colspan="3">☐ No
☒ Yes, Pre-Application Meeting: Date of Meeting: 05/07/2014
Air Staff Name(s): Jim Grillo, Kiernan Wholean
☒ Yes, Application Review Meeting: Date of Meeting: 08/13/2014
Air Staff Name(s): Jim Grillo, Kiernan Wholean</td></tr>
</table>

2. BILLING CONTACT (If different than the applicant)					
Name					
Mailing Address					
City/Town		**State**		**Zip Code**	
Contact Person					
Business Phone No.		**Extension No.**			
Email					
3. PRIMARY CONTACT FOR DEPARTMENTAL CORRESPONDENCE AND INQUIRIES (if different than the applicant)					
Name					
Title					
Company/Individual Name					
Mailing Address					
City/Town		**State**		**Zip Code**	
Business Phone No.		**Extension No.**			
Email					

By providing this e-mail address you are agreeing to receive official correspondence from DEEP, at this electronic address, concerning the subject application. Please remember to check your security settings to be sure you can receive e-mails from "ct.gov" addresses. Also, please notify DEEP if your e-mail address changes.

Part III: Applicant Information (continued)

4. EQUIPMENT OWNER OR EQUIPMENT OPERATOR (Only complete if applicant is not both equipment owner and operator)					
Name	Check one: ☐ equipment owner ☐ equipment operator				
Title					
Company/Individual Name					
Mailing Address					
City/Town		**State**		**Zip Code**	
Business Phone No.		**Extension No.**			
Email					
5. ENGINEER(s) OR CONSULTANT(s) EMPLOYED OR RETAINED TO ASSIST IN PREPARING THIS APPLICATION (If different than the applicant)					
Name	**Steven J. Babcock, P.E.**				
Title	**Consulting Engineer**				
Company/Individual Name	**Tetra Tech, Inc.**				
Mailing Address	**160 Federal St., 3rd Floor**				
City/Town	**Boston**	**State**	**MA**	**Zip Code**	**02110**
Business Phone No.	**617-443-7500**	**Extension No.**	**7533**		
Email	**steven.j.babcock@tetratech.com**				
Service Provided	**Preparation of forms and supplemental information**				

☐ **Check here if additional sheets are necessary. Label and attach them to this sheet.**

Part IV: Site Information

1. SITE NAME AND LOCATION					
Name of Site	CPV Towantic, LLC				
Street Address or Location Description	16 Woodruff Hill Road				
City/Town	Oxford	State	CT	Zip Code	06478

2. INDIAN LANDS	
Is or will the premises be located on federally recognized Indian lands?	☐ Yes ☒ No

3. COASTAL MANAGEMENT ACT CONSISTENCY	
Is or will the activity which is the subject of this application be located within the coastal boundary as delineated on DEEP approved coastal boundary maps? Information on the coastal boundary is available at www.lisrc.uconn.edu. (Click on the upper tab or left hand column labeled "Maps", then "Coastal Connecticut") or the local town hall or on the "Coastal Boundary Map" available at DEEP Maps and Publications (860-424-3555).	☐ Yes ☒ No
If yes, Is this an application for a new permit or a modification of an existing permit where the physical footprint of the subject activity is modified?	☐ Yes ☐ No If yes**, and** if the activity which is the subject of this application is located within the coastal boundary as delineated on DEEP approved coastal boundary maps, you must complete and submit a *Coastal Consistency Review Form* (DEEP-APP-004) with your application as Attachment O.
If the activity is not located within the coastal boundary, is the activity which is the subject of this application located within the coastal area? (see town list in the instructions)	☐ Yes ☒ No

4. NATURAL DIVERSITY DATA BASE (NDDB) - ENDANGERED AND THREATENED SPECIES	
According to the most current "State and Federal Listed Species and Natural Communities Map", is the activity which is the subject of this application located within an area identified as a habitat for endangered, threatened or special concern species?	☒ Yes ☐ No Date of Map:
Is this an application for a new permit or a modification of an existing permit where the physical footprint of the subject activity is modified? For more information visit the DEEP website at http://www.ct.gov/deep/nddbrequest or call the NDDB at 860-424-3011.	☒ Yes ☐ No If yes, **and** if the project site is located within an area identified as a habitat for endangered, threatened or special concern species, complete and submit a *Request for NDDB State Listed Species Review Form* (DEEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the applicant.** The CT NDDB response ***must*** be submitted with this completed application as Attachment P.

Part IV: Site Information (continued)

5. AQUIFER PROTECTION AREAS	
Is the site located within a mapped Level A or Level B Aquifer Protection Area, as defined in CGS section 22a-354a through 22a-354bb?	☐ Yes ☒ No
If yes, check if Level A or Level B If Level A, are any of the regulated activities, as defined in RCSA section 22a-354i-1(34), conducted on this site?	☐ Level A or ☐ Level B ☐ Yes ☐ No If **yes**, and your business is **not** already registered with the Aquifer Protection Program, contact the local aquifer protection agent or DEEP to take appropriate actions. For more information on the Aquifer Protection Area Program visit the DEEP website at www.ct.gov/deep/aquiferprotection or contact the program at 860-424-3020.
6. CONSERVATION OR PRESERVATION RESTRICTION	
Is the premises subject to a conservation or preservation restriction?	☐ Yes ☒ No If yes, proof of written notice of this application to the holder of such restriction or a letter from the holder of such restriction verifying that this application is in compliance with the terms of the restriction, must be submitted as Attachment Q.
7. ENVIRONMENTAL JUSTICE COMMUNITY	
Does the site include an applicable facility which is located within an Environmental Justice Community, as defined in the Environmental Justice Public Participation Guidelines (Guidelines)?	☐ Yes ☒ No If yes, and this application is for a new or expanded permit, ***prior*** to submitting this application prepare an *Environmental Justice Public Participation Plan* (DEEP-EJ-PLAN-001) in accordance with the Guidelines and submit such plan to: Environmental Justice Program Office of the Commissioner Department of Energy and Environmental Protection 79 Elm Street Hartford, CT 06106-5127 Once you have received written approval for your Environmental Justice Public Participation Plan from the DEEP, submit this completed application with a copy of the Plan approval as Attachment R.
8. AIR QUALITY STATUS	
Indicate the air quality status of the area in which the premises is or will be located. (Check all that apply. See instructions for the air quality attainment status of Connecticut municipalities).	Ozone: ☐ Severe Non-Attainment ☒ Serious Non-Attainment $PM_{2.5}$: ☐ Non-Attainment ☒ Attainment

Part IV: Site Information (continued)

9. MAJOR STATIONARY SOURCE	
Is the premises a major stationary source?	☒ Yes ☐ No If yes, indicate the pollutant(s), if any, for which the premises exceeds the major stationary source threshold: ☒ PM ☒ PM_{10} ☒ $PM_{2.5}$ ☐ SO_2 ☒ NOx ☒ CO ☐ VOC ☐ Pb ☒ CO_2 ☐ HAPs
Is the premises operating under the GPLPE?	☐ Yes ☒ No If yes, indicate the Approval of Registration No.: **-**GPLPE
10. SIC CODES	Primary **4911** Secondary Other Other
11. NAICS CODE	**221112**

Part V: Attachments

Check the applicable box below for each attachment being submitted with this application form. When submitting any supporting documents, please label the documents as indicated in this Part (e.g., Attachment A, etc.) and be sure to include the applicant's name as indicated on this application form.

All referenced forms may be accessed electronically, in **WORD** and PDF versions, on the Air Emissions Permits webpage.

Attachment	Attachment Name		Form No.	Required?	Attached
AA	*Copy of Public Notice of Application and Original Certification of Notice Form*		DEEP-APP-005A	**Required**	☒
A	*Executive Summary*		DEEP-NSR-APP-222	**Required**	☒
B	*Applicant Background Information*		DEEP-APP-008	**Required**	☒
C	*Site Plan* - An 8 ½" X 11" copy of the Site Plan		*No DEEP form*	**Required**	☒
D	*USGS Map* - An 8 ½" X 11" copy of the relevant portion of a USGS Quadrangle Map indicating the exact location of the facility or site		*No DEEP form*	**Required**	☒
E	*Supplemental Application Forms*				--
	Select the appropriate forms for the source types listed in Part II of this form.	E201: *Manufacturing or Processing Operations*	DEEP-NSR-APP-201	If Applicable	☐
		E202: *Fuel Burning Equipment*	DEEP-NSR-APP-202	If Applicable	☒
		E203: *Incinerators or Landfill Flares*	DEEP-NSR-APP-203	If Applicable	☐
		E204: *Volatile Liquid Storage*	DEEP-NSR-APP-204	If Applicable	☐
		E205: *Surface Coating or Printing Operations*	DEEP-NSR-APP-205	If Applicable	☐
		E206: *Metal Plating or Surface Treatment Operations*	DEEP-NSR-APP-206	If Applicable	☐
		E207: *Metal Cleaning Degreasers*	DEEP-NSR-APP-207	If Applicable	☐
		E208: *Concrete, Asphalt Concrete, Mineral Processing or Other Similar Equipment*	DEEP-NSR-APP-208	If Applicable	☐
		E209: *Site Remediation Equipment*	DEEP-NSR-APP-209	If Applicable	☐

Part V: Attachments (continued)

Attachment	Attachment Name	Form No.	Required?	Attached
E	E210: *Air Pollution Control Equipment*	DEEP-NSR-APP-210	If Applicable	☒
	E211: *Stack and Building Parameters*	DEEP-NSR-APP-211	**Required**	☒
	E212: *Unit Emissions*	DEEP-NSR-APP-212	**Required**	☒
F	*Premises Information Form*	DEEP-NSR-APP-217	**Required**	☒
G	*BACT Determination Form*	DEEP-NSR-APP-214	**Required**	☒
H	*Major Modification Determination Form*	DEEP-NSR-APP-213	If Applicable	☐
I	*Prevention of Significant Deterioration (PSD) of Air Quality Form*	DEEP-NSR-APP-216	If Applicable	☒
J	*Non-Attainment Review Form*	DEEP-NSR-APP-215	If Applicable	☒
K	Operation and Maintenance Plan	*No DEEP form*	If Applicable	☐
L	Ambient Air Quality Analysis	*No DEEP form*	If Applicable	☒
M	*Applicant Compliance Information*	DEEP-APP-002	**Required**	☒
N	Marked Up Permit - For non-minor modifications, attach a marked up copy of the current NSR permit noting proposed changes	---	If Applicable	☒
O	*Coastal Consistency Review Form*	DEEP-APP-004	If Applicable	☐
P	***Copy of Response*** *to* *Request for Natural Diversity Data Base (NDDB) State Listed Species Review Form* and additional documentation	---	If Applicable	☒
Q	Conservation or Preservation Restriction Information	*No DEEP form*	If Applicable	☐
R	Copy of the Written Environmental Justice Public Participation Plan Approval Letter	---	If Applicable	☐

Part VI: Applicant Certification

The authorized representative **and** the individual(s) responsible for actually preparing the application must sign this part. An application will be considered insufficient unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I have complied with all notice requirements as listed in section 22a-6g of the General Statutes."

APPLICANT:			
Signature of Applicant	[signature]	**Date**	9/5/14
Name of Applicant (print or type)	CPV Towantic, LLC, By: Gary A. Lambert		
Title (if applicable)	President, CPV Towantic Holding Company, LLC acting solely in its capacity as Managing Member of CPV Towantic, LLC		
PREPARER:			
Signature of Preparer	Lynn Gresock	**Date**	9/5/14
Name of Preparer (print or type)	Lynn Gresock		
Title (if applicable)	Vice President		

Submit one hardcopy or electronic copy (in the form of a CD) of the completed application package. If submitting an electronic copy, DEEP-NSR-APP-200 and DEEP-APP-005A must be submitted as a hardcopy with original signatures along with the CD and such form should also be scanned and included in the CD. The Department of Energy and Environmental Protection (DEEP) encourages all applicants to submit their application electronically.

Submit completed form to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CONNECTICUT 06106-5127

Note: A *Permit Application Transmittal Form* (DEEP-APP-001) is **not** required with this application form.

Please remember to publish notice of the permit application **prior** to submitting your completed application to DEEP. Send a copy of the published notice to the chief elected official of the municipality in which the regulated activity is proposed and provide DEEP with a copy of the published notice, as described in the instructions, attached to a completed *Certification of Notice Form* (DEEP-APP-005A) as Attachment AA to this application.

ATTACHMENT AA – COPY OF PUBLIC NOTICE AND CERTIFICATION FORM

Provided on the following page is a copy of the Public Notice of Application and Original Certification of Notice Form (DEEP-APP-005A). The provided copy of the Public Notice of Application is a photocopy of the notice published in the New Haven Register on Friday, August 15, 2014.

Connecticut Department of
Energy & Environmental Protection

Certification of Notice Form - Notice of Application

DEEP USE ONLY
Division
Application No.

I, CPV Towantic, LLC, certify that
(Name of Applicant)

the attached notice represents a true copy of the notice that appeared in The New Haven Register
(Name of Newspaper)

on Friday, August 15, 2014
(Date)

I also certify that I have provided a copy of said notice to the chief elected municipal official listed below as required by section 22a-6g CGS.

George R. Temple	First Selectman - Town of Oxford
Name of Official	*Title of Official*

S.B. Church Memorial Town Hall, 486 Oxford Road
Address

Oxford	CT	06478-1298
City/Town	*State*	*Zip Code*

[signature]	9/5/14
Signature of Applicant	*Date*
CPV Towantic, LLC, By: Gary A. Lambert	President, CPV Towantic Holding Company, LLC acting solely in its capacity as Managing Member of CPV Towantic, LLC
Name of Applicant (print or type)	*Title (if applicable)*

AFFIDAVIT OF PUBLICATION

New Haven Register

STATE OF CONNECTICUT

County of New Haven

I, *Christopher Gilson* of New Haven, Connecticut, being duly sworn, do depose and say that I am a ***Sales Representative*** of the New Haven Register, and that on

the following date ....8/15/14.................to wit. 8/15/14...............

there was published in the regular daily edition of the said newspaper an

advertisement,

And that the newspaper extracts hereto annexed were clipped from each of the

above-named issues of said newspaper.

Subscribed and sworn to this ...26th..... day of August 20.14...Before me.

My commission expires July 31, 2019

Copy of Notice of Permit Application

Printed in the New Haven Register on Friday, August 15, 2014

Notice of Permit Application

Town: Oxford

Notice is hereby given that CPV Towantic, LLC (the "applicant") of 50 Braintree Hill Office Park, Suite 300, Braintree, MA 02184 will submit to the Department of Energy and Environmental Protection an application under section 22a-174 of the Connecticut General Statutes for a permit to construct, install, enlarge or establish an air contaminant source and to operate such air contaminant source and to operate such air contaminant source regulated under the federal Clean Air Act.

Specifically, the applicant proposes to construct and operate an 805 megawatt combined cycle electric generating facility. The proposed activity will take place at 16 Woodruff Hill Road, Oxford, Connecticut.

The proposed activity will potentially affect air resources.

Interested persons may obtain copies of the application from Lynn Gresock, Tetra Tech, 238 Littleton Road, Suite 201B, Westford, MA 01886 and 978-203-5352.

The application will be available for inspection at the Department of Energy and Environmental Protection, Bureau of Air Management, Engineering & Enforcement Division, 79 Elm Street, 5th floor, Hartford, CT 06106-5127, 860-424-4152, from 8:30 to 4:30 Monday through Friday. Please call in advance to schedule review of the application.

ATTACHMENT A – EXECUTIVE SUMMARY

Provided on the following pages is a completed Executive Summary form (DEEP-NSR-APP-222). Prior to the form, a brief project description is provided outlining:

- A description of the proposed regulated activities;
- A synopsis of the environmental and engineering analyses, include a summary or cross-reference to appropriate data analyses;
- A conclusion of any environmental impacts and the proposed timeline for construction; and
- Information describing the changes in project configuration from the project's current approval (issued on June 1, 2010).

I. LOCATION OF THE FACILITY

CPV Towantic, LLC (CPV Towantic) proposes to construct and operate a nominal 805-megawatt (MW) combined-cycle electric generating facility (the Project) located on Woodruff Hill Road in Oxford, Connecticut. The proposed Project will be constructed on a 26-acre parcel at a greenfield location in Oxford, Connecticut. The site is located in New Haven County, approximately 5 miles southwest of Waterbury, Connecticut and approximately 0.5 mile to the east of the Waterbury-Oxford Airport. The exact location of the facility and equipment can be found in Attachments C and D of this application.

II. PROJECT DESCRIPTION

CPV Towantic proposes to construct and operate a nominal 805-MW combined-cycle electric generating facility located on Woodruff Hill Road in Oxford, Connecticut. The proposed Project is an update of the currently authorized Project previously approved by the Connecticut Department of Energy and Environmental Protection (DEEP), Town-Permit Number #144-0011 dated June 1, 2010. The changes from the approved project include the following:

- Update in combustion turbine to a General Electric (GE) Model 7HA.01;
- Addition of supplemental natural gas firing of the heat recover steam generators (HRSG); and
- Incorporation of layout adjustments of equipment on the site.

This application has been prepared to include all the information requested for a new project.

The proposed Project will consist of two GE Model 7HA.01 combustion turbine-generators (CTGs) exhausting into two supplementary-fired HRSGs. The CTGs will be fired primarily with natural gas, with limited use of ultra-low sulfur distillate (ULSD) oil as backup fuel. The steam produced from the HRSGs will power one reheat tandem compound double flow steam turbine generator (STG). The STG exhaust steam will be condensed via a multi-fan air cooled condenser (ACC). The balance of the Project will include an auxiliary boiler, emergency generator engine, emergency fire pump engine, and an aqueous ammonia (NH_3) storage tank.

The Project will have potential emissions above the Prevention of Significant Deterioration (PSD) major source threshold for nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter ($PM/PM_{10}/PM_{2.5}$), and greenhouse gases (GHGs). The Project will have potential NO_x emissions above the non-attainment new source review (NNSR) threshold. The Project will also have potential emissions of sulfuric acid mist (H_2SO_4) and volatile organic compounds (VOCs) above their respective PSD significant emissions thresholds. Therefore, the Project will be subject to PSD permitting for NO_x, CO, $PM/PM_{10}/PM_{2.5}$, VOC, H_2SO_4, and GHGs. The Project will be subject to NNSR permitting for NO_x.

CPV Towantic is applying for a New Source Review (NSR) permit from the DEEP for the Project. The NSR permit is required under Section 22a-174-3a of the Connecticut regulations. This document, along with the accompanying DEEP forms and other appended materials, is the PSD and NNSR application for the Project.

Emissions of sulfur dioxide (SO_2) will be below its PSD significant emissions rate threshold but above the DEEP de minimis permitting threshold based on potential emissions as specified in Section 22a-174-3a(a)(1)(D). Emissions of NH_3 will also be above the DEEP de minimis permitting threshold. As a result, SO_2 and NH_3 emissions will trigger DEEP Best Available Control Technology (BACT) requirements under Section 22a-174-3a(j)(1)(C); this application also addresses the permitting requirements for these pollutants.

Emissions of NO_x are subject to NNSR and the Project is required to implement Lowest Achievable Emission Rate (LAER) controls for this pollutant. The Project will install selective catalytic reduction (SCR) to control NO_x emissions. The proposed LAER emission rates for the CTGs are provided in Table A-1. The basis for the NO_x LAER emission rate is provided in Attachment J, including a completed Non-Attainment Review of Air Quality form (DEEP-NSR-APP-215).

Table A-1: Proposed LAER and BACT Emission Rates – Combustion Turbines

Pollutant	Natural Gas Firing (without duct firing)	Natural Gas Firing (with duct firing)	ULSD Firing
NO_x	2.0 ppmvd @15% oxygen (O_2)	2.0 ppmvd @15% O_2	5.0 ppmvd @15% O_2
VOC	1.0 ppmvd @15% O_2	2.0 ppmvd @15% O_2	2.0 ppmvd @15% O_2
CO	0.9 ppmvd @15% O_2	1.7 ppmvd @15% O_2	2.0 ppmvd @15% O_2
$PM/PM_{10}/PM_{2.5}$	0.0041 lb/MMBtu (at full load)	0.0081 lb/MMBtu (at full load)	0.020 lb/MMBtu (at full load)
H_2SO_4	0.00115 lb/MMBtu	0.00117 lb/MMBtu	0.00125 lb/MMBtu
GHG	7,220 Btu/kW-hr (net, at ISO full load, no supplemental firing, natural gas firing) 2,656,018 tons per rolling 12-month period		
SO_2	0.0015 lb/MMBtu (≤0.5 gr S/100 scf)	0.0015 lb/MMBtu (≤0.5 gr S/100 scf)	0.0015 lb/MMBtu (≤15 ppmw S)
NH_3	5.0 ppmvd @15% O_2	5.0 ppmvd @15% O_2	5.0 ppmvd @15% O_2

ppmvd = parts per million volume dry basis
lb/MMBtu = pounds per million British thermal units of fuel fired
Btu/kW-hr = British thermal units of fuel fired per kilowatt of electricity generated
lb/MW-hr = pounds per megawatt hour of electricity generated
gr S/100 scf = grains of sulfur per 100 standard cubic feet of natural gas
ppmw = parts per million weight

Emissions of CO, $PM/PM_{10}/PM_{2.5}$, H_2SO_4, GHGs, NO_x, and VOC are subject to PSD and the Project is required to implement BACT controls for these pollutants. Emissions of NO_x will satisfy BACT requirements by meeting LAER requirements as discussed above. The Project will install an oxidation catalyst to control CO and VOC emissions. The Project will fire natural gas as the primary fuel, with limited use of ULSD to limit H_2SO_4 emissions. Advanced combined-cycle combustion turbine technology will be used to satisfy BACT for GHG emissions. The proposed PSD BACT emission rates for the CGTs are provided below in Table A-1. The basis for the PSD BACT emission rates are provided in Attachment I, including a completed PSD of Air Quality form (DEEP-NSR-APP-216).

A dispersion modeling analysis was conducted in accordance with DEEP and United States Environmental Protection Agency (USEPA) regulations, standards and guidance. The proposed LAER and BACT emission rates were used in the analysis. The analysis shows that the predicted ambient concentrations are in compliance with all applicable ambient air quality standards. A complete discussion of the dispersion modeling analysis and results is provided in Attachment L.

The Project is proposed to begin construction in December 2015 with commencement of operation in 2018.

Attachment A: Executive Summary

Applicant Name: **CPV Towantic, LLC**

Complete this form in accordance with the instructions (DEEP-NSR-INST-200) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this attachment to provide information for the project which is the subject of this application package.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Location of Facility or Activity	**Woodruff Hill Road, Oxford, CT**

Part II: Application Table of Contents

Provide a Table of Contents of the application which includes the *Permit Application for Stationary Sources of Air Pollution Form* (DEEP-NSR-APP-200), and a list of all supplemental application forms, plans, drawings, reports, studies, or other supporting documentation which are attached as part of the application, along with the corresponding attachment label and the number of pages (e.g., Executive Summary - Attachment A - 4 pgs.).

Appendix B: Manufacturer Information - 84 pages

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Attachment A: Executive Summary (continued)

Part III: Project Description

Provide a brief project description which includes:

- a description of the proposed regulated activities;
- a synopsis of the environmental and engineering analyses;
- summaries of data analysis;
- a conclusion of any environmental impacts and the proposed timeline for construction; and
- for a renewal or modification provide a list of changes in circumstances or information on which the previous permit or registration was based.

See previous attached text

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

ATTACHMENT B – APPLICANT BACKGROUND INFORMATION

Provided on the following pages is a completed Applicant Background Information form (DEEP-APP-008).

Connecticut Department of
Energy & Environmental Protection

Applicant Background Information

Check the box by the entity which best describes the applicant and complete the requested information. **You must choose one of the following: corporation, limited liability company, limited partnership, general partnership, voluntary association and individual or business type.**

☐ **Corporation**

☐ Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. Parent Corporation
   Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext.:
   Contact Person: Phone: ext.
   E-mail:
2. Subsidiary Corporation:
   Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext.:
   Contact Person: Phone: ext.
   E-mail:
3. Directors:
   Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext.:
   E-mail:
4. Officers:
   Name:
   Mailing Address:
   City/Town: State: Zip Code:
   Business Phone: ext.:
   E-mail:

Applicant Background Information (continued)

☒ **Limited Liability Company**

☐ Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. List each member.

Name: **CPV Towantic, LLC**
Mailing Address: 50 Braintree Hill Office Park, Suite 300
City/Town: Braintree State: MA Zip Code: 02184
Business Phone: (781) 848-3611 ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

2. List any manager(s) who, through the articles of organization, are vested the management of the business, property and affairs of the limited liability company.

Name: **Gary Lambert**
Mailing Address: 50 Braintree Hill Office Park, Suite 300
City/Town: Braintree State: MA Zip Code: 02184
Business Phone: (781) 848-2786 ext.:
E-mail: ppodurgiel@cpv.com

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Applicant Background Information (continued)

☐ **Limited Partnership**

☐ Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. General Partners:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

2. Limited Partners:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Applicant Background Information (continued)

☐ **General Partnership**

☐ Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. General Partners:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
Contact Person: Phone: ext.
E-mail:

Applicant Background Information (continued)

☐ **Voluntary Association**

☐ Check box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. List authorized persons of association or list all members of association.

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

☐ **Individual or Other Business Type**

☐ Check the box, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. Name:
Mailing Address:
City/Town: State: Zip Code:
Business Phone: ext.:
E-mail:

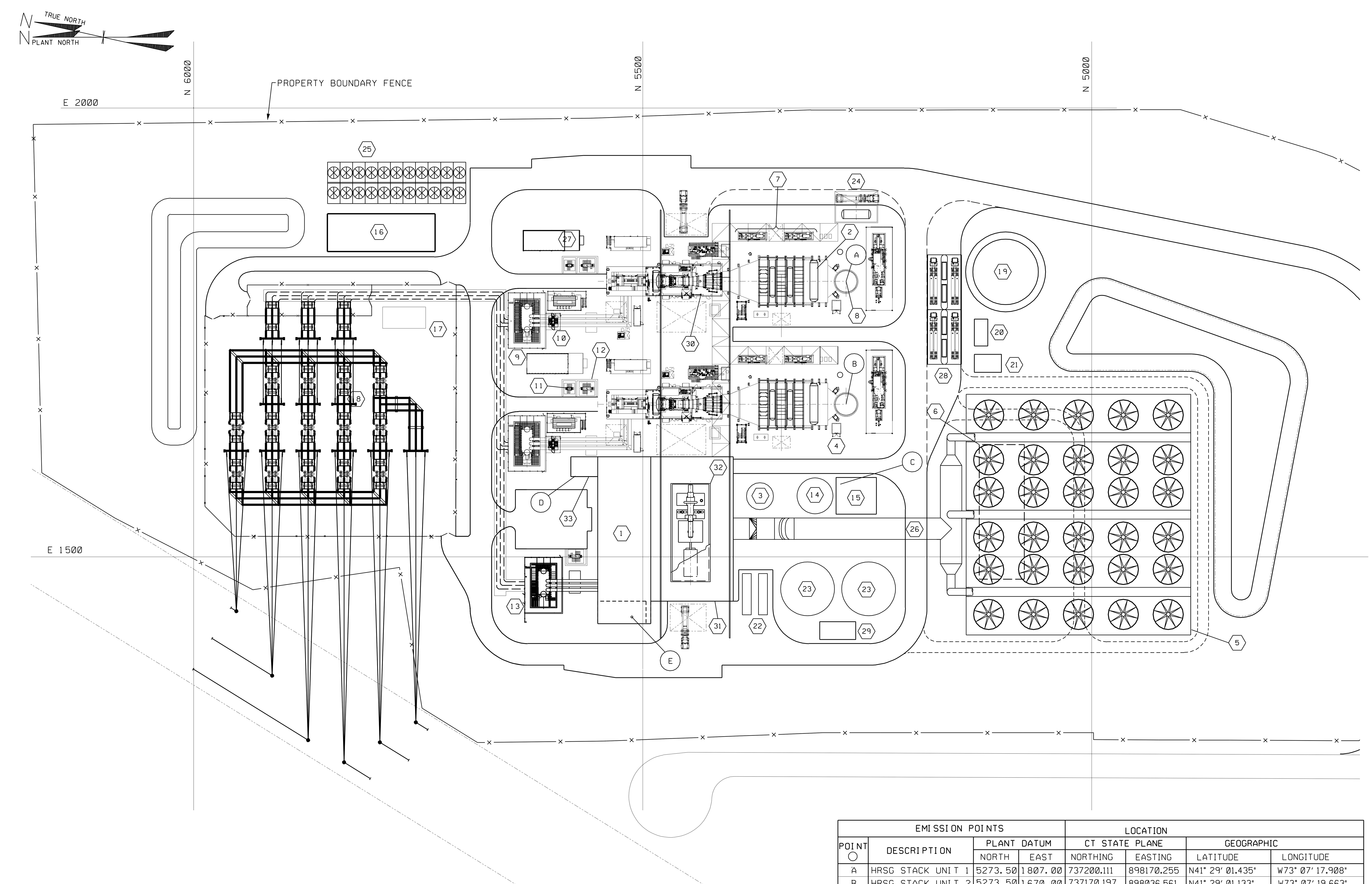
2. State other names by which the applicant is known, including business names.
Name:

ATTACHMENT C – SITE PLAN

Provided on the following page is an 8½" x 11" drawing to scale showing the location of the Project. Additional plans and drawings are provided such that the following requested information is provided:

- The north meridian arrow and the scale shown as a bar scale;
- The exact location of the stacks from which the sources will exhaust;
- The latitude and longitude of the stacks;
- A boundary lines of the property and measurements (identified by use of drawing scales);
- The horizontal distance from the stack base to the nearest property line (identified by use of scales);
- The top view of all buildings or structures, indicating actual dimensions;
- The location of all stacks on the property; and
- The final grade elevation (i.e., height) of all structures on the property.

Due to the amount of detail in these drawings, an 11" x 17" version is also provided.



BUILDINGS, MAJOR EQUIPMENT AND STRUCTURES		
NO.	DESCRIPTION	SIZE (FEET)
1	ADMIN/CONTROL/ELECTRICAL BLDG.	59W X 186L X 52H
2	HEAT RECOVERY STEAM GENERATOR (HRSG)	48W X 138L X 110H
3	CONDENSATE STORAGE TANK	30 DIA X 40H
4	CONTINUOUS EMISSIONS MONITORING (CEM) ENCLOSURE	8W X 12L X 8H
5	AIR COOLED CONDENSER	250W X 268L X 85H
6	ELECTRICAL/MECHANICAL BUILDING	50W X 150L X 18H
7	BOILER FEED PUMP AREA	12W X 83L X 16H
8	STACK	22 DIA X 150H
9	CTG STEP-UP TRANSFORMER	30W X 48L X 20H
10	AUX. TRANSFORMER	14W X 20L X 16H
11	EXCITATION TRANSFORMER	8W X 9L X 8H
12	ISOLATION TRANSFORMER	10W X 12L X 12H
13	STG STEP-UP TRANSFORMER	30W X 48L X 20H
14	FIRE PROTECTION/SERVICE WATER STORAGE TANK	40 DIA X 40H
15	FIRE PROTECTION/SERVICE WATER PUMP HOUSE	45W X 41L X 17.5H
16	GAS METERING STATION	50W X 100L X 10H
17	SWITCHYARD CONTROL HOUSE	24W X 48L X 16H
18	SWITCHYARD	270W X 320L X 21.5H (TOP OF BREAKER BUS) 65H (TOP OF TOWER)
19	FUEL OIL STORAGE TANK WITH SECONDARY STEEL CONTAINMENT	73 DIA X48H
20	FUEL OIL FORWARDING PUMP/HEATER/ FILTER SKID	15W X 30L X 12H
21	FIRE PROTECTION FOAM SYSTEM ENCLOSURE	20W X 30L X 16H
22	DEMINERALIZED WATER TRAILERS	28W X 48L X 12H
23	DEMINERALIZED WATER STORAGE TANK (TWO(2) STORAGE TANKS EACH 875,000 GAL)	60DIA X 42H
24	AMMONIA STORAGE TANK AREA	20W X 50L X 14H
25	FIN FAN COOLER (AUX COOLING)	60W X 100L X 20H
26	STEAM EXHAUST DUCT	24DIA. CL EL 32'-0"
27	LCI	23W X 62L X 12H
28	FO UNLOADING AREA	38W X 124L X 16H
29	DEMINERALIZED WATER PUMP HOUSE	20W X 40 X 15H
30	COMBUSTION TURBINE GENERATOR	37W X 129L X 37H
31	TURBINE BUILDING	92W X 161L X 37H
32	STG ENCLOSURE	44W X 110L X 27H
33	EMERGENCY DIESEL GENERATOR ENCLOSURE	22W X 30L X 15H

EMISSION POINTS		LOCATION					
POINT	DESCRIPTION	PLANT DATUM		CT STATE PLANE		GEOGRAPHIC	
		NORTH	EAST	NORTHING	EASTING	LATITUDE	LONGITUDE
A	HRSG STACK UNIT 1	5273.50	1807.00	737200.111	898170.255	N41° 29' 01.435"	W73° 07' 17.908"
B	HRSG STACK UNIT 2	5273.50	1670.00	737170.197	898036.561	N41° 29' 01.133"	W73° 07' 19.663"
C	FIRE PUMP DIESEL ENGINE EXHAUST	5280.00	1581.00	737157.107	897948.289	N41° 29' 01.000"	W73° 07' 20.822"
D	EMERGENCY DIESEL GENERATOR EXHAUST	5575.00	1590.00	737446.954	897892.659	N41° 29' 03.862"	W73° 07' 21.569"
E	AUXILIARY BOILER STACK	5512.00	1412.00	737351.194	897753.204	N41° 29' 02.909"	W73° 07' 23.396"

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn JGF | Designed JGF | Checked

Lead Engineer | Date | Scale 1"=60'-0"

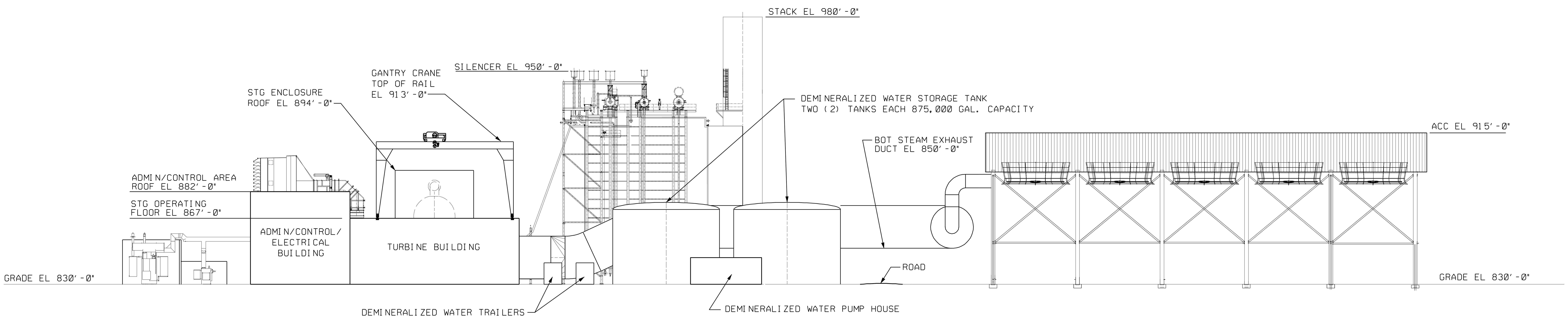
CPV TOWANTIC ENERGY CENTER
OXFORD, CONNECTICUT

BUILDING DIMENSIONS/EMISSION POINT LOCATIONS (OUTDOOR FACILITY)

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
Connecticut License No. PEC 39

Approved for Construction: Chief MECHANICAL Engineer | Work Order 3328 | Drawing No M302 | Sh | Rev D

$$DGNFILENAME$$
$$TIME$$
$$DATE$$



ELEVATION LOOKING EAST
M202

GRAPHIC SCALE
0 15' 30' 60' 90'
1" = 30.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr	Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		
Drawn	Designed	Checked
JGF	JGF	

Lead Engineer | Date | Scale 1"=30'-0"

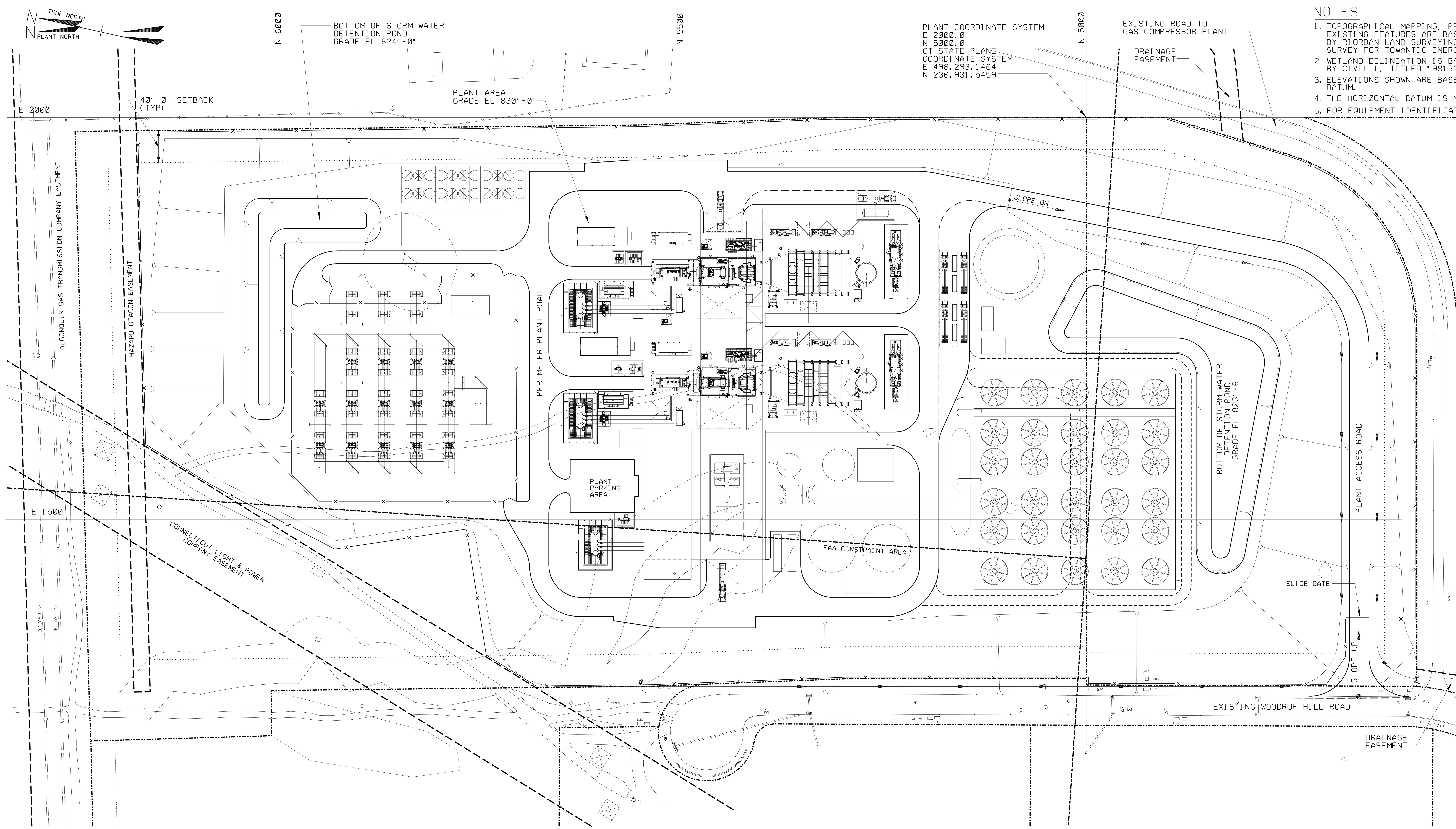
CPV TOWANTIC ENERGY CENTER
OXFORD, CONNECTICUT

GENERAL ARRANGEMENT
ELEVATION LOOKING EAST

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
Connecticut License No. PEC 39

Approved for Construction	Work Order	Drawing No	Sh	Rev
Chief MECHANICAL Engineer	3328	M301		B

$$DGNFILENAME$$
$$TIME$$
$$DATE$$



NOTES

1. TOPOGRAPHICAL MAPPING, PROPERTY SURVEY AND EXISTING FEATURES ARE BASED ON A SURVEY PERFORMED BY RIORDAN LAND SURVEYING, TITLED PROPERTY SURVEY FOR TOWANTIC ENERGY, LLC DATD 5/10/14.
2. WETLAND DELINEATION IS BASED ON A DRAWING PREPARED BY CIVIL 1, TITLED '98132 BASE MAP', DATED 7/28/14.
3. ELEVATIONS SHOWN ARE BASED ON THE NAVD88 VERTICAL DATUM.
4. THE HORIZONTAL DATUM IS NAD83/87 COORDINATE SYSTEM.
5. FOR EQUIPMENT IDENTIFICATION, SEE DRAWING M300.

LEGEND

- EXIST PROPERTY LINE
- EXIST PROPERTY EASEMENT
- EXIST FENCE
- EXIST WETLAND
- EXIST 50' WETLAND BUFFER
- EXIST STORM DRAIN
- EXIST CATCH BASIN
- EXIST TELEPHONE/ ELECT VAULT
- PROPERTY SETBACK
- TOP OF SLOPE SLOPING GRADE
- BOT OF SLOPE
- DRAINAGE SWALE
- FENCE LINE

GRAPHIC SCALE

0 30' 60' 120' 180'

1"=60.0'

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr
B	REVISED SWITCHYARD LAYOUT		JH		
C	REVISED WETLAND DELINEATION AND NOTES		JH		

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Fabrication				
For Construction				

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
Instr		

Drawn JH | Designed | Checked

Lead Engineer | Date | Scale 1"=60'-0"

CPV TOWANTIC ENERGY CENTER
OXFORD, CONNECTICUT

SITE PLAN

BURNS AND ROE ENTERPRISES, INC.
Engineers and Constructors - Oradell, NJ
Connecticut License No. PEC 39

Approved for Construction	Work Order	Drawing No	Sh	Rev
Chief CIVIL Engineer	3328	C305		C

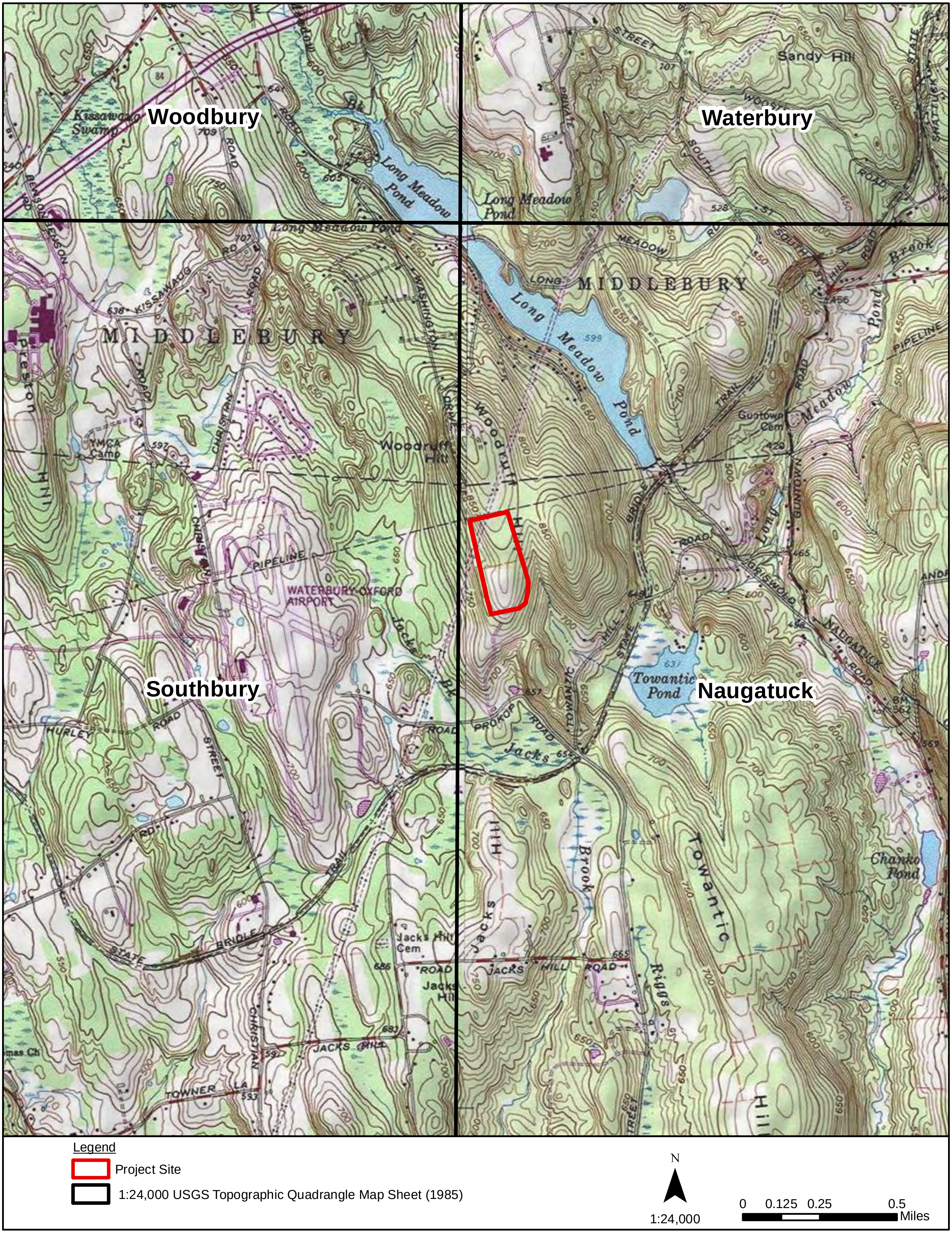
$$DGNFILENAME$$

$$TIME$$

$$DATE$$

ATTACHMENT D – USGS TOPOGRAPHIC QUADRANGLE MAP

Provided on the following page is an 8½” x 11” figure of the relevant portion of a United States Geological Survey (USGS) Quadrangle Map, at a scale of 1:24,000, including the names of the quadrangles. The figure shows the exact location of the Project site and the proposed activities, including an outline of the premises boundary.



Woodbury
Waterbury
Southbury
Naugatuck
MIDDLEBURY
Long Meadow Pond
Woodruff Hill
WATERBURY-OXFORD AIRPORT
Towantic Pond
Jacks Hill
Chanko Pond
Legend
Project Site
1:24,000 USGS Topographic Quadrangle Map Sheet (1985)
N
1:24,000
0
0.125
0.25
0.5
Miles

ATTACHMENT E – SUPPLEMENTAL APPLICATION FORMS

The following supplemental attachment forms are provided, unless indicated as “Not Applicable”:

- Attachment E202: Fuel Burning Equipment:
  - Auxiliary Boiler (AB)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (See Appendix B)
    - Attachment E202-C: Emissions Profile (Not Applicable)
  - Combustion Turbine #1 (CT#1)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (See Appendix B)
    - Attachment E202-C: Emissions Profile (See Appendix A)
  - Combustion Turbine #2 (CT#2)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (See Appendix B)
    - Attachment E202-C: Emissions Profile (See Appendix A)
  - Duct Burner for CT#1 (DB#1)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (Information is not available)
    - Attachment E202-C: Emissions Profile (Not Applicable)
  - Duct Burner for CT#2 (DB#2)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (Information is not available)
    - Attachment E202-C: Emissions Profile (Not Applicable)
  - Emergency Generator Engine (EG)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (See Appendix B)
    - Attachment E202-C: Emissions Profile (Not Applicable)
  - Emergency Fire Pump Engine (FP)
    - Attachment E202-A: Flow Diagram
    - Attachment E202-B: Manufacturer Information (See Appendix B)
    - Attachment E202-C: Emissions Profile (Not Applicable)

- Attachment E210: Air Pollution Control Equipment (DEEP-NSR-APP-210)
  - Attachment E210(SCR1) – Manufacturer Information (Information was not available)
  - Attachment E210(OC1)* – Manufacturer Information (Information was not available)
  - Attachment E210(SCR2) – Manufacturer Information (Information was not available)
  - Attachment E210(OC2) – Manufacturer Information (Information was not available)
- Attachment E211: Stack and Building Parameters (DEEP-NSR-APP-211)
  - Attachment E211-A: Plot Plan (See Attachment C)
- Attachment E212: Unit Emissions (DEEP-NSR-APP-212)
  - AB
    - Attachment E212-A: Sample Calculations (See Appendix A)
    - Attachment E212-B: Completed CT Maximum Allowable Stack Concentration (MASC) spreadsheet (See Appendix A)
    - Attachment E212-C: Completed Carbon Dioxide Equivalent (CO_{2e}) Calculator Spreadsheet (See Appendix A)
  - CT#1 / DB#1
    - Attachment E212-A: Sample Calculations (See Appendix A)
    - Attachment E212-B: Completed CTMASC spreadsheet (See Appendix A)
    - Attachment E212-C: Completed CO_{2e} Calculator Spreadsheet (See Appendix A)
  - CT#2 / DB#2
    - Attachment E212-A: Sample Calculations (See Appendix A)
    - Attachment E212-B: Completed CT MASC spreadsheet (See Appendix A)
    - Attachment E212-C: Completed CO_{2e} Calculator Spreadsheet (See Appendix A)
  - EG
    - Attachment E212-A: Sample Calculations (See Appendix A)
    - Attachment E212-B: Completed CTMASC spreadsheet (See Appendix A)
    - Attachment E212-C: Completed CO_{2e} Calculator Spreadsheet (See Appendix A)
  - FP
    - Attachment E212-A: Sample Calculations (See Appendix A)
    - Attachment E212-B: Completed CTMASC spreadsheet (See Appendix A)
    - Attachment E212-C: Completed CO_{2e} Calculator Spreadsheet (See Appendix A)

Prior to the forms is a discussion of the emission sources, the procedures used to calculate potential emissions, and operating restrictions taken to limit potential emissions.

* OC = Oxidation Catalyst

POTENTIAL EMISSIONS METHODOLOGY

This section presents short-term and long-term potential emissions from each emission source for the Project. CPV Towantic proposes to use dry low-NO_x combustion and SCR to minimize NO_x emissions from the CTGs. Combustion controls and an oxidation catalyst will be used to minimize CO and VOC emissions from the CTGs. $PM/PM_{10}/PM_{2.5}$, SO_2, and H_2SO_4 will be limited through the use of natural gas as the primary fuel for the CTGs with limited firing of ULSD as backup fuel. The duct burners and auxiliary boiler will be fired solely with natural gas. ULSD will be used for the emergency generator and fire pump engines. Attachment G of this application contains a control technology analysis to demonstrate that these controls meet applicable LAER and BACT requirements. Appendix A of this application contains detailed emission calculations and Appendix B contains equipment specifications and vendor performance data for the proposed emission sources.

EMISSION SOURCES

The emission sources for the Project will include the following:

- Two combined-cycle electric power generation units, each consisting of a GE Model 7HA.01 CTG with an associated HRSG. Each HRSG will be equipped with duct burners for supplemental firing. Steam from both HRSGs will be sent to a common STG. Each unit will be equipped with dry low-NO_x combustors, SCR for NO_x control, and an oxidation catalyst for control of CO and VOC;
- One natural gas-fired auxiliary boiler rated at 92.4 million British thermal units per hour (MMBtu/hr), equipped with ultra low-NO_x burners (Cleaver Brooks "Nebraska" D-type boiler or equivalent);
- One emergency diesel generator engine rated at 1,500 kilowatt (kW) (standby rating), firing ULSD oil (Caterpillar 3512C or equivalent);
- One emergency diesel fire pump engine rated at approximately 315 kW, firing ULSD (Clarke JW6H-UFADJ0 or equivalent); and
- Fugitive emissions of GHGs from onsite electrical circuit breakers and natural gas handling equipment.

The Project will utilize an ACC for condenser cooling and there will be no emissions from this equipment. The Project will also include miscellaneous insignificant sources such as a ULSD storage tank, aqueous ammonia storage tank and lubricant oil storage tanks.

SHORT-TERM EMISSIONS

Combustion Turbine and Duct Burners

Short-term potential emission rates for each combined-cycle unit, including the CTG and associated duct burner, are presented in Table E-1. The pound per hour (lb/hr) rates shown are based on 100% load operation at -14.2 degrees Fahrenheit (°F) with duct burner firing, and represent the worst-case operating scenario. Potential emission rates are presented in: ppmvd at 15% O_2; lb/MMBtu on a high heating value (HHV) basis; and lb/hr. SO_2 emissions are based on a maximum natural gas sulfur content of 0.5 gr S/100 scf.

Table E-1: Maximum Short-Term Emission Rates for Combustion Turbines and Duct Burners (per unit)

Pollutant	Natural Gas Firing			ULSD Firing		
	ppmvd (15% O_2)	lb/MMBtu	lb/hr	ppmvd (15% O_2)	lb/MMBtu	lb/hr
NO_x, all conditions	2.0	0.0074	26.8	5.0	0.0194	52.0
CO, unfired	0.9	0.0020	5.3	2.0	0.0047	12.7
CO, fired	1.7	0.0038	13.8	N/A	N/A	N/A
VOC, unfired	1.0	0.0013	3.4	2.0	0.0027	6.2
VOC, fired	2.0	0.0026	8.8	N/A	N/A	N/A
SO_2, all conditions	N/A	0.0015	6.2	N/A	0.0015	4.9
PM/PM_{10}/$PM_{2.5}$, unfired[a]	N/A	0.0041	9.7	N/A	0.020	42.6
PM/PM_{10}/$PM_{2.5}$, fired[a]	N/A	0.0081	20.4	N/A	N/A	N/A
H_2SO_4, all conditions	N/A	0.0012	4.0	N/A	0.0013	3.2
NH_3, all conditions	5.0	0.0068	24.7	5.0	0.0072	19.2

[a] PM/PM_{10}/$PM_{2.5}$ lb/MMBtu emission rates are at full operating load.

Ancillary Equipment

Short-term potential emission rates for the auxiliary boiler and the emergency engines are presented in Table E-2. Potential emission rates are presented in lb/MMBtu; grams per kilowatt-hour (g/kWh) or grams/brake horsepower (g/bhp), as appropriate; and in lb/hr.

Table E-2: Short-Term Emission Rates for Ancillary Equipment

Pollutant	Auxiliary Boiler		Emergency Generator		Fire Pump	
	lb/MMBtu	lb/hr	g/bhp	lb/hr	g/kWh	lb/hr
NO_x	0.011	1.01	4.08	19.84	3.8	2.64
CO	0.037	3.42	0.44	2.14	0.9	0.63
VOC	0.0041	0.38	0.11	0.53	0.1	0.07
SO_2	0.0015	0.14	0.0015 lb/MMBtu	0.02	0.0015 lb/MMBtu	0.004
PM/ PM_{10}/ $PM_{2.5}$	0.007	0.65	0.03	0.15	0.13	0.09
H_2SO_4	0.00011	0.011	0.00011 lb/MMBtu	0.002	0.00011 lb/MMBtu	0.0003

Annual Emissions

The proposed potential annual emissions from the Project are summarized in Table E-3. Potential annual emissions are based on 8,760 operating hours for each combustion turbine along with the following assumptions:

- Combustion turbines operating for 3,790 hours per year at 100% load, operating at 59°F, firing gas without duct firing;
- Combustion turbines operating for 4,250 hours per year at 100% load, operating at 59°F, firing gas with duct firing;
- Combustion turbines operating for 720 hours per year at 100% load, operating at 59°F, firing ULSD;
- The auxiliary boiler, operating 4,000 hours per year at 100% load; and
- The emergency generator and fire pump engines each operating 300 hours per year at 100% load.

Table E-3: Facility-Wide Annual Potential Emissions (tons per year [tpy])

Pollutant	Unit 1 (CTG & HRSG)	Unit 2 (CTG & HRSG)	Auxiliary Boiler	Emergency Generator	Fire Pump	Facility Total
NO_x [a]	94.7	94.7	2.02	2.98	0.40	194.7
CO [a]	64.5	64.5	6.83	0.32	0.09	136.2
VOC [a]	24.5	24.5	0.75	0.08	0.01	49.9
SO_2	19.7	19.7	0.28	0.003	0.001	39.7
$PM/PM_{10}/PM_{2.5}$	76.7	76.7	1.29	0.02	0.01	154.7
GHGs (as CO_2e)	1,328,009	1,328,009	21,627	354	60	2,678,612 [b]
H_2SO_4	12.7	12.7	0.02	0.0002	0.00004	25.3
Lead (Pb)	1.7E-02	1.7E-02	9.1E-05	1.7E-06	2.8E-07	0.034
NH_3	77.7	77.7	N/A	N/A	N/A	155.3
Total HAPS	5.60	5.60	0.35	0.01	0.003	11.6

[a] Includes incremental emissions due to start-up and shutdown.
[b] Includes 554 tpy of fugitive GHG emissions from circuit breakers and natural gas handling.

The combustion turbines have higher mass emission rates of NO_x, CO, and VOC during start-up and shutdown (SU/SD) than during steady-state operation. The impact of increased emissions during SU/SD was evaluated to determine their impact on potential emissions for the Project. Start-ups for combined-cycle systems are generally classified as cold, warm, and hot depending upon the length of time the unit has been off-line prior to start-up. The length of start-ups will vary with the type of start-up and equipment temperatures. However, the GE 7HA.01 combustion turbines can reach full load from initial start-up in no more than one hour for all start types.

The maximum number of starts per year per turbine was determined based upon turbine vendor recommendations and projected operation in the competitive power marketplace. The increase in emissions per type of start was quantified using emissions and operating data provided by GE. The increase in emissions for each type of start was then compared to the reduction in emissions associated with the turbine downtime preceding each type of SU/SD event. Any increase in SU/SD emissions for each type of start was added to the potential steady state emissions. This potential to emit approach represents the worst-case maximum potential to emit for the Project. Each start type was evaluated with a shutdown, as a start-up cannot occur without a prior shutdown. Based upon this analysis, the incremental increase in emissions from a hot start was the worst case and, therefore, it was assumed that the Project would have 200 hot starts and 50 cold starts per year. The incremental increase in potential emissions due to SU/SD is as follows:

- NO_x: 0 tpy per turbine
- CO: 29.5 tpy per turbine
- VOC: 6.3 tpy per turbine

SU/SD emissions calculations are provided in detail in Appendix A.

Hazardous Air Pollutant Emissions

Potential annual hazardous air pollutant (HAP) emissions are presented in detail in Appendix A. The operating scenarios described above were applied when calculating potential HAP emissions. Total HAP emissions from the Project are estimated to be 11.6 tpy, with a maximum potential emission for any single HAP (formaldehyde) of 2.7 tpy.

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **AB**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☒ Boiler ☐ IC Engine ☐ Duct Burner ☐ Heater/Furnace ☐ Turbine ☐ Other (specify):	
Manufacturer and Model Number	CB-Nebraska NB-300D-70 (or equivalent)	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **Dc**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☐ No ☒ Yes, Subpart(s) **JJJJJJ**	
Maximum Design Heat Input	92.4 MMBtu/hr	
Typical Heat Input	92.4 MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**4,000** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	**100** %
	Power:	%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
Natural Gas	0.0016	1,028	89,900	359,600,000	ft3

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	**CB-NATCOM (or equivalent)**
Number of Burners	**1**
Burner Maximum Rated Capacity (per burner)	92.4 MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☒ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☐ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☐ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	HP
IC Engine Power Output	MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☐ Combined Cycle
Turbine Power Output	MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☒ Low NOx Burners ☒ Flue Gas Recirculation ☐ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☐ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☐ None

Part VI: Attachments

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E202-A, etc.) and be sure to include the applicant's name.

☒ Attachment E202-A:	*Process Information and Flow Diagram* – Submit a process flow diagram indicating all related equipment, air pollution control equipment and stacks, as applicable. Identify all materials entering and leaving each such device indicating quantities and parameters relevant to the proper operation of the device. Indicate all monitoring devices and controls. **REQUIRED**
☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☐ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **CT1**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☐ Heater/Furnace ☐ IC Engine ☒ Turbine ☐ Duct Burner ☐ Other (specify):	
Manufacturer and Model Number	GE 7HA01	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **KKKK**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☐ No ☒ Yes, Subpart(s) **YYYY (stayed indefinitely)**	
Maximum Design Heat Input	2,526 @ -14.2F MMBtu/hr	
Typical Heat Input	2,426 @ ISO conditions MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**8760** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	%
	Power:	**100**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
Natural Gas	0.0016	1,028	2.46E06	2.15E10	ft3
ULSD	0.0015	138,000	18,290	1.3E7	gal

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☐ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☐ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	HP
IC Engine Power Output	MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☒ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☒ Combined Cycle
Turbine Power Output	262 @ ISO conditions MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☒ Low NOx Burners ☐ Flue Gas Recirculation ☒ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☒ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☐ None

Part VI: Attachments

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☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☒ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **CT2**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☐ IC Engine ☐ Duct Burner	☐ Heater/Furnace ☒ Turbine ☐ Other (specify):
Manufacturer and Model Number	GE 7HA01	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **KKKK**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☐ No ☒ Yes, Subpart(s) **YYYY (stayed indefinitely)**	
Maximum Design Heat Input	2,526 @ -14.2F MMBtu/hr	
Typical Heat Input	2,426 @ ISO conditions MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**8760** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	%
	Power:	**100**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
Natural Gas	0.0016	1,028	2.46E06	2.15E10	ft3
ULSD	0.0015	138,000	18,290	1.3E7	gal

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☐ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☐ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	HP
IC Engine Power Output	MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☒ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☒ Combined Cycle
Turbine Power Output	262 @ ISO conditions MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☒ Low NOx Burners ☐ Flue Gas Recirculation ☒ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☒ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☐ None

Part VI: Attachments

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☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☒ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **DB1**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☐ Heater/Furnace ☐ IC Engine ☐ Turbine ☒ Duct Burner ☐ Other (specify):	
Manufacturer and Model Number	TBD	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **KKKK**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☒ No ☐ Yes, Subpart(s)	
Maximum Design Heat Input	962 MMBtu/hr	
Typical Heat Input	962 MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**4,250** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	%
	Power:	**100**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
Natural Gas	0.0016	1,028	935,895	3.98E09	ft3

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☐ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☐ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	HP
IC Engine Power Output	MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☐ Combined Cycle
Turbine Power Output	MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☒ Low NOx Burners ☐ Flue Gas Recirculation ☒ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☒ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☐ None

Part VI: Attachments

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E202-A, etc.) and be sure to include the applicant's name.

☒ Attachment E202-A:	*Process Information and Flow Diagram* – Submit a process flow diagram indicating all related equipment, air pollution control equipment and stacks, as applicable. Identify all materials entering and leaving each such device indicating quantities and parameters relevant to the proper operation of the device. Indicate all monitoring devices and controls. **REQUIRED**
☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☐ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **DB2**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☐ IC Engine ☒ Duct Burner	☐ Heater/Furnace ☐ Turbine ☐ Other (specify):
Manufacturer and Model Number	TBD	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **KKKK**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☒ No ☐ Yes, Subpart(s)	
Maximum Design Heat Input	962 MMBtu/hr	
Typical Heat Input	962 MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**4,250** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	%
	Power:	**100**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
Natural Gas	0.0016	1,028	935,895	3.98E09	ft3

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☐ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☐ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	HP
IC Engine Power Output	MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☐ Combined Cycle
Turbine Power Output	MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☒ Low NOx Burners ☐ Flue Gas Recirculation ☒ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☒ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☐ None

Part VI: Attachments

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E202-A, etc.) and be sure to include the applicant's name.

☒ Attachment E202-A:	*Process Information and Flow Diagram* – Submit a process flow diagram indicating all related equipment, air pollution control equipment and stacks, as applicable. Identify all materials entering and leaving each such device indicating quantities and parameters relevant to the proper operation of the device. Indicate all monitoring devices and controls. **REQUIRED**
☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☐ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **EG**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☐ Heater/Furnace ☒ IC Engine ☐ Turbine ☐ Duct Burner ☐ Other (specify):	
Manufacturer and Model Number	Caterpillar 3512C (or equivalent)	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **IIII**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☐ No ☒ Yes, Subpart(s) **ZZZZ**	
Maximum Design Heat Input	14.4 MMBtu/hr	
Typical Heat Input	14.4 MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**300** hours/year
Percentage of Annual Use in Each Category	Space Heat:	%
	Process Heat:	%
	Power:	**100**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
ULSD	0.0015%	138,000	104.6	31,380	gal

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☒ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☒ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☒ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	2,206 HP
IC Engine Power Output	1.500 MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☐ Combined Cycle
Turbine Power Output	MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☐ Low NOx Burners ☐ Flue Gas Recirculation ☐ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☐ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☒ None

Part VI: Attachments

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E202-A, etc.) and be sure to include the applicant's name.

☒ Attachment E202-A:	*Process Information and Flow Diagram* – Submit a process flow diagram indicating all related equipment, air pollution control equipment and stacks, as applicable. Identify all materials entering and leaving each such device indicating quantities and parameters relevant to the proper operation of the device. Indicate all monitoring devices and controls. **REQUIRED**
☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☐ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

Attachment E202: Fuel Burning Equipment Supplemental Application Form

Applicant Name: **CPV Towantic, LLC**
Unit No.: **FP**

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-202) to ensure the proper handling of your application. Print or type unless otherwise noted.

Note: Certain external combustion units may be operated pursuant to RCSA section 22a-174-3b or -3c in lieu of a permit to construct and operate pursuant to RCSA section 22a-174-3a.

Complete a separate form for *each* fuel burning source.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: General

Type of Unit *(check one)*	☐ Boiler ☒ IC Engine ☐ Duct Burner ☐ Heater/Furnace ☐ Turbine ☐ Other (specify):	
Manufacturer and Model Number	Clarke JW6H-UFADJ0 (or equivalent)	
Construction Date		
Manufacture Date		
Is this unit subject to Title 40 CFR Part 60, NSPS?	☐ No ☒ Yes, Subpart(s) **IIII**	
Is this unit subject to Title 40 CFR Part 63, MACT?	☐ No ☒ Yes, Subpart(s) **ZZZZ**	
Maximum Design Heat Input	2.45 MMBtu/hr	
Typical Heat Input	2.45 MMBtu/hr	
Maximum Operating Schedule	**24** hours/day	**300** hours/year
Percentage of Annual Use in Each Category	Space Heat:	**N/A**%
	Process Heat:	**N/A**%
	Power:	**N/A**%

Part II: Fuel Information

Fuel Type	% Sulfur by weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
ULSD	0.0015%	138,000	17.8	5,330	gal

Note: Parts III and IV are unit specific. Complete only that section which applies to the subject unit.

Part III: External Combustion Unit Information (Boiler or Heater/Furnace)

Burner Manufacturer and Model Number	
Number of Burners	
Burner Maximum Rated Capacity (per burner)	MMBtu/hr
Firing Type and Method Information *(Choose all that apply)*	
Oil/Gas Fired Unit	☐ Tangentially Fired ☐ Horizontally Opposed (normal) Fired ☐ Other (specify):
Pulverized Coal Fired Unit	☐ Dry Bottom ☐ Wet Bottom ☐ Wall Fired ☐ Tangentially Fired ☐ Horizontally Fired ☐ Vertically Fired ☐ Other (specify):
Coal/Wood Fired Stoker Unit	☐ Overfeed ☐ Underfeed ☐ Spreader ☐ Hand Fed ☐ IGCC (Integrated Gasification Combined Cycle) ☐ Other (specify):
Coal/Wood Fired Fluidized Bed Combustor	☐ Circulating Bed ☐ Bubbling Bed ☐ Cyclone Furnace ☐ Other (specify):
Other Coal/Wood Fired Unit	☐ Suspension Firing ☐ Dutch Oven/Fuel Cell Oven ☐ Over Fire Air ☐ Other (specify):

Part IV: Internal Combustion (IC) Unit Information (IC Engine or Turbine)

IC Engine Information	
IC Engine Operation *(check one)*	☒ Emergency Only ☐ Emergency/Non-Emergency
IC Engine Ignition *(check one)*	☒ Compression ☐ Spark
IC Engine Type *(check one)*	☐ 4-Stroke Rich Burn (4SRB) ☒ 4-Stroke Lean Burn (4SLB) ☐ 2-Stroke Lean Burn (2SLB)
IC Engine Brake Horsepower	350 HP
IC Engine Power Output	N/A MW
Turbine Information	
Turbine Operation *(check one)*	☐ Emergency Only ☐ Emergency/Non-Emergency
Turbine Type *(check one)*	☐ Simple Cycle ☐ Combined Cycle
Turbine Power Output	MW

Part V: Combustion Controls Information (Check all that apply)

Type of Combustion Control(s) or Modifications(s)	☐ Low NOx Burners ☐ Flue Gas Recirculation ☐ Selective Catalytic Reduction ☐ Coal Reburn ☐ Gas Reburn ☐ Lean Burn ☐ Rich Burn ☐ Low Excess Air ☐ Other (specify):	☐ Fly Ash Reinjection ☐ Reburn ☐ Selective Non-Catalytic Reduction ☐ Oxidation Catalyst ☐ 3-way Catalyst ☐ Over Fire Air ☐ Biased Burner Firing ☐ Burners Out of Service ☒ None

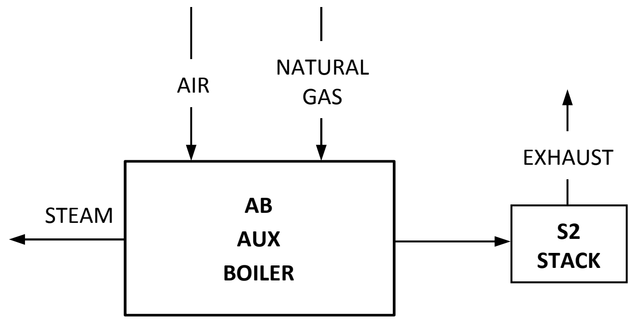
Part VI: Attachments

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E202-A, etc.) and be sure to include the applicant's name.

☒ Attachment E202-A:	*Process Information and Flow Diagram* – Submit a process flow diagram indicating all related equipment, air pollution control equipment and stacks, as applicable. Identify all materials entering and leaving each such device indicating quantities and parameters relevant to the proper operation of the device. Indicate all monitoring devices and controls. **REQUIRED**
☒ Attachment E202-B:	*Manufacturer Information* - Submit copies of the manufacturer specification sheets for the unit, the air pollution control equipment and the monitoring systems. **REQUIRED**
☐ Attachment E202-C:	*Turbine Emissions Profiles* - Submit copies of manufacturer's emissions profile data for steady state and transient operation of the turbine. **IF APPLICABLE**

ATTACHMENT E202-A - PROCESS FLOW DIAGRAMS

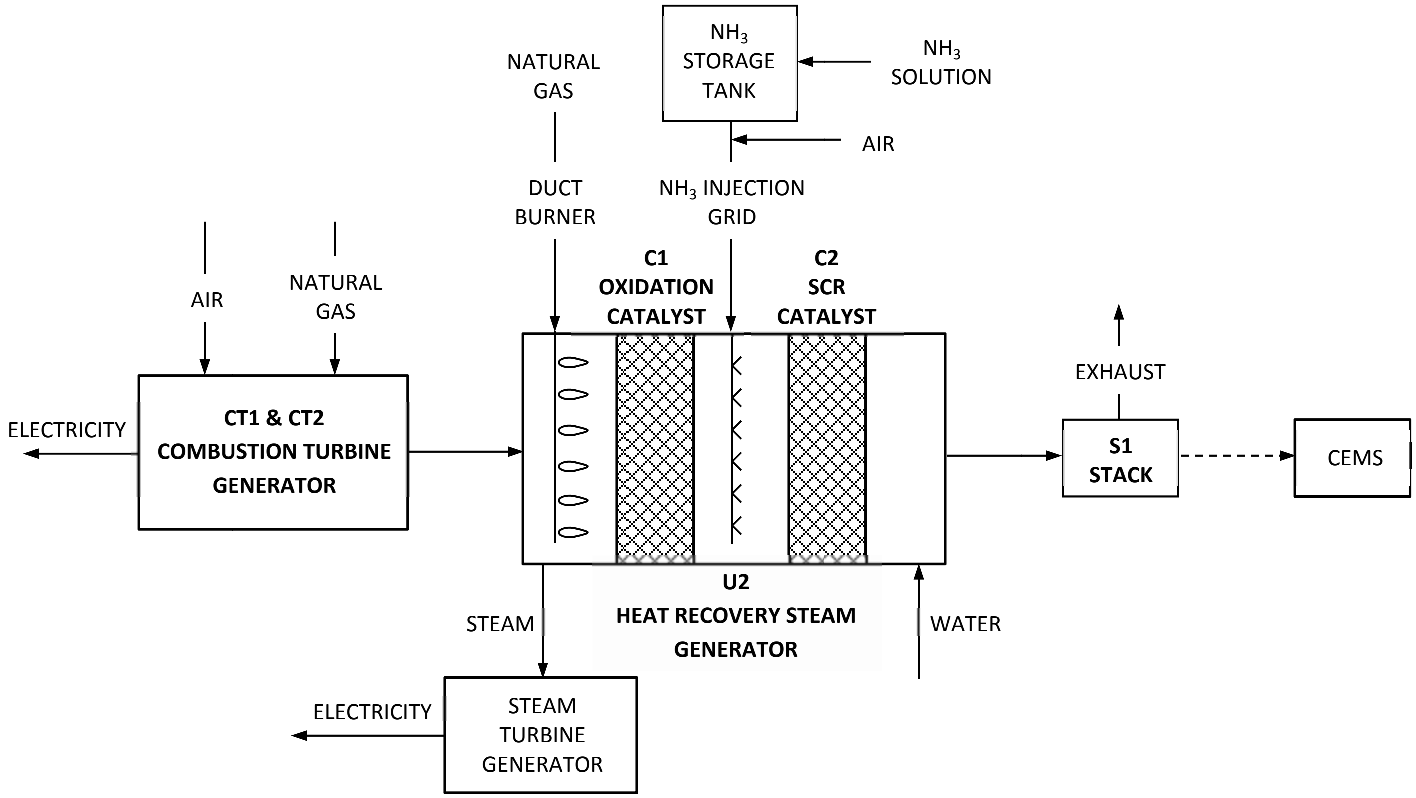
AUXILIARY BOILER – PROCESS FLOW DIAGRAM



NOTE: Material quantities provided in Appendix A

ATTACHMENT E202-A - PROCESS FLOW DIAGRAMS

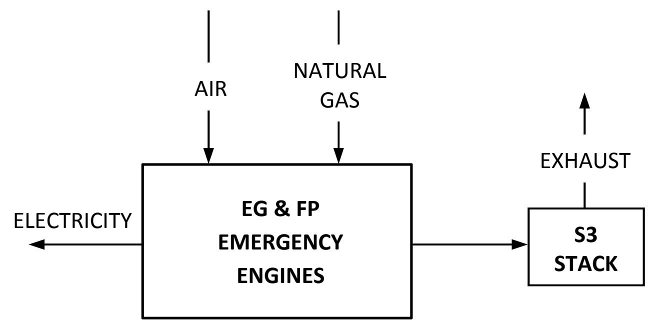
COMBUSTION TURBINES AND DUCT BURNERS – PROCESS FLOW DIAGRAM



NOTE: Material quantities provided in Appendix A

ATTACHMENT E202-A - PROCESS FLOW DIAGRAMS

EMERGENCY GENERATOR AND FIRE PUMP ENGINES – PROCESS FLOW DIAGRAM



NOTE: Material quantities provided in Appendix A

Attachment E210: Air Pollution Control Equipment Supplemental Application Form

Applicant Name: **CPV Towantic. LLC**
Unit No(s).: **CT1/DB1 and CT1/DB2**

DEEP USE ONLY
App. No.: ________

Complete this form in accordance with the instructions (DEEP-NSR-INST-210) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this supplemental application form to provide the air pollution control equipment information for all units that are part of this application package.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I. Summary Sheet

Unit No.	Unit Description	Control Equipment		Overall Control Efficiency (%)	Pollutant(s) Controlled	*Basis	Stack No.
		No.	Type				
CT1/DB	**Combined Cycle Combustion Turbine #1**	**SCR1**	**SCR**	**90 (est)**	**NOx**	**Vendor Guarantee**	**1**
CT1/DB	**Combined Cycle Combustion Turbine #1**	**OC1**	**Oxidation Catal**	**90 (est)**	**CO, VOC**	**Vendor Guarantee**	**1**
CT2/DB	**Combined Cycle Combustion Turbine #2**	**SCR2**	**SCR**	**90 (est)**	**NOx**	**Vendor Guarantee**	**2**
CT2/DB	**Combined Cycle Combustion Turbine #2**	**OC2**	**Oxidation Catal**	**90 (est)**	**CO, VOC**	**Vendor Guarantee**	**2**

** Submit supporting documentation with this form, e.g., stack test data, manufacturer's guarantees, etc. as Attachment E210(Control Equipment No.).*

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Part II: Specific Control Equipment

Complete the appropriate subsection for each *distinct* piece of control equipment.

1. Adsorption Device

Control Equipment Number of Adsorption Unit: ______________________________

Unit Number of Unit which Uses Adsorption Unit: ____________________________

Manufacturer and Model Number		
Construction Date		
Adsorbent		☐ Activated Charcoal Type: ☐ Granulated ☐ Other (specify): ☐ Powdered
Number of Beds		
Dimensions of Beds ☐ Check here if additional sheets are necessary, and label and attach them to this sheet.	**Bed No. 1**	Thickness in direction of gas flow: inches Cross-section area: square inches
	Bed No. 2	Thickness in direction of gas flow: inches Cross-section area: square inches
	Bed No. 3	Thickness in direction of gas flow: inches Cross-section area: square inches
Inlet Gas Temperature		^{o}F
Design Pressure Drop Range Across Unit		inches H_2O
Gas Flow Rate		scfm
Type of Regeneration		☐ Replacement ☐ Steam ☐ Other (specify):
Method of Regeneration		☐ Alternate use of beds ☐ Source shut down ☐ Other (specify): Describe procedures used to ensure that emissions from regeneration process are treated or minimized:
Maximum Operation Time Before Regeneration		
Is Adsorber Equipped with a Break-Through Detector?		☐ Yes ☐ No
Pollutant(s) Controlled		
Collection Efficiency(s) of Adsorber		%
Control Efficiency(s) of Adsorber		%
Overall Control Efficiency(s)		%

2. Afterburner (Incinerator for Air Pollution Control)

Control Equipment Number of Afterburner: **OC1 & OC2 (Identical Devices)**

Unit Number of Unit which Uses Afterburner: **CT1/DB1 & CT2/DB2**

Manufacturer and Model Number		TBD
Construction Date		2015
Type of Afterburner		☐ Thermal ☒ Catalytic ☐ Other (specify):
Combustion Chamber Dimensions	**Length**	TBD inches
	Cross-section area	TBD square inches
Inlet Gas Temperature		700 °F
Operating Temperature Range of Chamber		600-800 °F
Auxiliary Fuel Information		

Fuel Type	% Sulfur by Weight	Higher Heating Value (BTU)	Maximum Hourly Firing Rate	Maximum Annual Fuel Usage	Units (gal or ft^3)
None	N/A	N/A	N/A	N/A	N/A

Number of Burners		N/A
Burner Maximum Heat Input	**Burner No. 1**	N/A BTU per hour
	Burner No. 2	BTU per hour
	Burner No. 3	BTU per hour
Catalyst Used		☒ Yes ☐ No
Catalyst Type		platinum
Catalyst Sampling Interval		TBD
Heat Exchanger Used		☐ Yes ☒ No
Type of Heat Exchanger		
Heat Recovery		
Reagent Used		N/A
Gas Flow Rate		1,052,605 @ ISO on gas w/o duct firing scfm
Combustion Chamber Design Residence Time		TBD seconds
Moisture Content of Exhaust Gas		9 %
Heat Recovery		0 %
Pollutant(s) Controlled		CO & VOC
Collection Efficiency(s) of Afterburner		100 %

2. Afterburner (Incinerator for Air Pollution Control) (continued)

Control Equipment Number of Afterburner: **OC1 & OC2 (Identical Devices)**

Unit Number of Unit which Uses Afterburner: **CT1/DB1 & CT2/DB2**

Control Efficiency(s) of Afterburner	90% for CO %
Overall Control Efficiency(s)	90% for CO %

3. Condenser

Control Equipment Number of Condenser: ______________________________

Unit Number of Unit which Uses Condenser: ____________________________

Manufacturer and Model Number		
Construction Date		
Heat Exchange Area	square feet	
Coolant Flow Rate	☐ Water: gpm ☐ Air: scfm ☐ Other (specify) :	
Gas Flow Rate	scfm	
Coolant Temperature	In: ^{o}F	Out: ^{o}F
Gas Temperature	In: ^{o}F	Out: ^{o}F
Pollutant(s) Controlled		
Collection Efficiency(s) of Condenser	%	
Control Efficiency(s) of Condenser	%	
Overall Control Efficiency(s)	%	

4. Electrostatic Precipitator

Control Equipment Number of Electrostatic Precipitator: ____________________________

Unit Number of Unit which Uses Electrostatic Precipitator: __________________________

Manufacturer and Model Number	
Construction Date	
Collecting Electrode Area	square feet
Gas Flow Rate	scfm
Voltage Across the Precipitator Plates	kV
Resistivity of Pollutants	ohms
Number of Fields in the Precipitator	
Grain Loading	In: grains/scf Out: grains/scf
Pollutant(s) Controlled	
Collection Efficiency(s) of Electrostatic Precipitator	%
Control Efficiency(s) of Electrostatic Precipitator	%
Overall Control Efficiency(s)	%

5. Filter

Control Equipment Number of Filter: ______________________________

Unit Number of Unit which Uses Filter: ______________________________

Manufacturer and Model Number	
Construction Date	
Filtering Material	
Air to Cloth Ratio	square feet
Net Cloth Area	square feet
Number of Bags	
Cleaning Method	☐ Shaker ☐ Reverse Air ☐ Pulse Air ☐ Pulse Jet ☐ Other (specify):
Gas Cooling Method	☐ Ductwork Length: ft. Diameter: in. ☐ Heat Exchanger ☐ Bleed-in Air ☐ Water Spray ☐ Other (specify): ☐ Not Applicable
Cooling Medium Flow Rate	☐ Bleed-in Air: scfm ☐ Water Spray: gpm
Exhaust Gas Flow Rate	scfm
Inlet Gas Temperature	^oF
Inlet Gas Dew Point	^oF
Grain Loading	In: grains/scf Out: grains/scf
Design Pressure Drop Across Unit	inches H_2O
Operating Pressure Drop Range Across Unit	inches H_2O
Pollutant(s) Controlled	
Collection Efficiency(s) of Filter	%
Control Efficiency(s) of Filter	%
Overall Control Efficiency(s)	%

6. Cyclone

Control Equipment Number of Cyclone: ______________________________

Unit Number of Unit which Uses Cyclone: ____________________________

Manufacturer and Model Number	
Construction Date	
Type of Cyclone	☐ Single ☐ Multiple: Number of Cyclones
Gas Flow Rate	scfm
Grain Loading	In: grains/scf Out: grains/scf
Design Pressure Drop Across Unit	inches H_2O
Pollutant(s) Controlled	
Collection Efficiency(s) of Cyclone	%
Control Efficiency(s) of Cyclone	%
Overall Control Efficiency(s)	%

7. Mist Eliminator

Control Equipment Number of Mist Eliminator: ______________________________

Unit Number of Unit which Uses Mist Eliminator: ____________________________

Manufacturer and Model Number	
Construction Date	
Face Velocity	feet per second ☐ Vertical Flow ☐ Horizontal Flow ☐ Diagonal
Design Pressure Drop Range Across Unit	inches H_2O
Flow Rate	scfm
Pollutant(s) Controlled	
Collection Efficiency(s) of Mist Eliminator	%
Control Efficiencies of Mist Eliminator	% @ 1 mmHg % @ 5 mmHg % @ 10 mmHg
Overall Control Efficiency(s)	%

8. Scrubber

Control Equipment Number of Scrubber: ________________________________

Unit Number of Unit which Uses Scrubber: ______________________________

Manufacturer and Model Number		
Construction Date		
Type of Scrubber		☐ Venturi
		☐ Wet Fan
		☐ Packed: Packing Material Size: Packed Height: inches
		☐ Spray: Number of Nozzles: Nozzle No. 1 Pressure: psig Nozzle No. 2 Pressure: psig Nozzle No. 3 Pressure: psig Nozzle No. 4 Pressure: psig
		☐ Other (specify):
Design Pressure Drop Range Across Unit		inches H_2O
Type of Flow		☐ Concurrent ☐ Countercurrent ☐ Crossflow
Scrubber Geometry	**Length in direction of gas flow**	feet
	Cross-sectional area	square inches
Chemical Composition of Scrubbing Liquid		
Scrubbing Liquid/Reagent Flow Rate		gpm
Fresh Liquid Make-Up Rate		gpm
Scrubber Liquid/Reagent Circulation		☐ One Pass ☐ Recirculated
Scrubber Liquid/Reagent pH		
Gas Flow Rate		scfm
Inlet Gas Temperature		^{o}F
Design Outlet Grain Loading		gr/dscf
Pollutant(s) Controlled		
Collection Efficiency(s) of Scrubber		%
Control Efficiency(s) of Scrubber		%
Overall Control Efficiency(s)		%

9. Other Control Equipment for Degreasing Equipment

Name of Control Equipment: ______________________________

Control Equipment Number of Control Equipment: ________________

Unit Number of Unit which Uses Control Equipment: _______________

Manufacturer and Model Number	
Construction Date	
Method of Control	☐ Refrigerator Chiller ☐ Water Spray ☐ Other (specify):
Pollutant(s) Controlled	
Collection Efficiency(s) of Control Equipment	%
Control Efficiency(s) of Control Equipment	%
Overall Control Efficiency(s)	%

10. Other Type of Control Equipment

Name of Control Equipment: **SCR1 & SCR2 (Identical Devices)**

Control Equipment Number of Control Equipment: **SCR1 & SCR2 (Identical Devices)**

Unit Number of Unit which Uses Control Equipment: **CT1/DB1 & CT2/DB2**

Manufacturer and Model Number	TBD
Construction Date	2015
Pollutant(s) Controlled	NOx
Collection Efficiency(s) of Control Equipment	100 %
Control Efficiency(s) of Control Equipment	90 (estimate) %
Overall Control Efficiency(s)	90 (estimate) %

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E210(Control Equipment No.), etc.) and be sure to include the applicant's name.

☒	Attachment E210:	*Manufacturer Information* - Submit supporting documentation for each piece of air pollution control equipment listed in Part I of this form, e.g., stack test data, manufacturer's guarantees, etc. Label each document in this Attachment referencing the applicable air pollution control equipment number as indicated in Part I of this form using this format: Attachment E210(Control Equipment No.). **REQUIRED**

Attachment E211: Stack and Building Parameters Supplemental Application Form

Applicant Name: CPV Towantic, LLC

Complete this form in accordance with the instructions (DEEP-NSR-INST-211) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this supplemental application form to provide the stack and building parameter information for all units that are part of this application package.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I. Stack Parameters Summary

Stack No.	Unit No.(s)	Control Equipment No.(s)	Stack Height (feet)	Stack Diameter (feet)	Stack Exit Temp (^oF)		Stack Exhaust Flow Rate (ACFM)		Stack Exit Direction (H or V)	Rain Hat (Y or N)	Stack Lining Material	Stack Distance to Nearest Property Line (feet)
					Max	Min	Max	Min				
1	CT1, DB1	LNB1, SCR1, OC1	150	22	304	170	1.63E06	6.63E05	V	N	Metal	188
2	CT2, DB2	LNB2, SCR2, OC2	150	22	304	170	1.63E06	6.63E05	V	N	Metal	325
3	AB	LNB3, FGR1	125	4.0	260	N/A	19,578	N/A	V	N	Metal	136
4	EG	N/A	14.5	1.2	1,145	N/A	10,909	N/A	V	N	Metal	295
6	FP	N/A	17.5	0.7	961	N/A	1,877	N/A	V	N	Metal	275

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Part II. Building Parameters Summary

Complete this Part if a Stack Height Review or Screening Ambient Air Quality Analysis is required. This Part is not required for sources performing a Refined Modeling Analysis.

Building No.	Building Description	Building Height (H) (feet)	Building Length (L) (feet)	Building Width (W) (feet)	Building Distance to				Building Distance to Nearest Property Line (feet)
					Stack No.	Stack No.	Stack No.	Stack No.	

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Part III. Attachment

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E211-A, etc.) and be sure to include the applicant's name.

☑	Attachment E211-A:	*Plot Plan* – Submit a detailed plot plan of the facility with all structures, stack locations, and property lines clearly delineated. In addition you may submit sketches, aerial photos, or other site plans to aid in the identification of buildings listed in Part II and their locations with respect to the stacks listed in Part I. **REQUIRED**

Attachment E212: Unit Emissions Supplemental Application Form

DEEP USE ONLY
App. No.: ______

Applicant Name: CPV Towantic , LLC
Unit No.: AB

Complete this form in accordance with the instructions (DEEP-NSR-INST-212) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for *each* unit.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Unit Emission Information

Pollutant	Potential Emissions at Maximum Capacity		Proposed Allowable Emissions		
	lb/hr	tpy	lb/hr	Other Units *(specify)*	tpy
Criteria Air Pollutants					
PM	0.65	2.85		0.007 lb/MMBtu	1.29
PM_{10}	0.65	2.85		0.007 lb/MMBtu	1.29
$PM_{2.5}$ Total (filterable + condensable)	0.65	2.85		0.007 lb/MMBtu	1.29
SO_x	0.14	0.61			0.28
NO_x	1.01	4.42		0.011 lb/MMBtu	2.02
CO	3.42	15.0		0.037 lb/MMBtu	6.83
VOC	0.38	1.64		0.0041 lb/MMBtu	0.75
Pb	4.5E-05	1.96E-04			9.1E-05
GHG	1.08E04	4.74E04			21,627
Hazardous or Other Air Pollutants					
See Appendix A					

Potential Emissions Calculation Basis: Vendor Data

Proposed Allowable Emissions Calculation Basis: **Vendor Data and 359,533,000 ft3/yr of gas**

Part II: Regulatory Standards

Enter the regulatory standard(s) and the proposed allowable emissions for each pollutant emitted by the unit using the same units (e.g., ppmvd, lb/MMBTU, lb/hour, lb/day, etc.). More than one regulatory standard will often apply to a unit for a particular pollutant, list all that apply. Enter the regulatory citation(s) for the standard(s).

NOTE: The applicant should be aware of any existing regulatory standard applicable to the unit and should not propose allowable emissions in excess of the regulatory standard(s).

Pollutant	Regulatory Standard(s) *(specify units)*	Proposed Allowable Emissions *(specify units)*	Regulatory Citation(s)
Criteria Air Pollutants			
PM			
PM_{10}			
$PM_{2.5}$ Total (filterable + condensable)			
SO_x			
NO_x			
CO			
VOC			
Pb			
GHG			
Hazardous or Other Air Pollutants *(Standards other than RCSA §22a-174-29)*			

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E212-A, etc.) and be sure to include the applicant's name.

☒	Attachment E212-A:	*Sample Calculations*- Submit sample calculations used to determine all emissions rates, excluding GHG. See Attachment E212-C for GHG emissions. **REQUIRED**
☒	Attachment E212-B:	*RCSA section 22a-174-29 Hazardous Air Pollutants Compliance* – Submit a completed CTMASC spreadsheet**,** or equivalent, to demonstrate compliance with RCSA section 22a-174-29. **REQUIRED**
☒	Attachment E212-C:	*Greenhouse Gas Emissions* – Submit a completed CO_2 Equivalents Calculator Spreadsheet, or equivalent, used to quantify Greenhouse Gas emissions, **REQUIRED**

Attachment E212: Unit Emissions Supplemental Application Form

Applicant Name: CPV Towantic, LLC
Unit No.: CT1 & DB1

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-212) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for *each* unit.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Unit Emission Information

Pollutant	Potential Emissions at Maximum Capacity		Proposed Allowable Emissions		
	lb/hr	tpy	lb/hr	Other Units *(specify)*	tpy
Criteria Air Pollutants					
PM	42.6	186.6		See Attached	76.7
PM_{10}	42.6	186.6		Tables	76.7
$PM_{2.5}$ Total (filterable + condensable)	42.6	186.6			76.7
SO_x	6.2	27.2			19.7
NO_x	52.0	227.8			94.7
CO	13.8	60.4			64.5
VOC	8.82	38.6			24.5
Pb	3.53E-02	0.155	3.53E-02		1.7E-02
GHG	415,048	1.82E06	415,048		1,328,009
Hazardous or Other Air Pollutants					
See Appendx A					

Potential Emissions Calculation Basis: **Vendor Data**

Proposed Allowable Emissions Calculation Basis: **Vendor Data/operating restrictions in Exec. Summary**

Part II: Regulatory Standards

Enter the regulatory standard(s) and the proposed allowable emissions for each pollutant emitted by the unit using the same units (e.g., ppmvd, lb/MMBTU, lb/hour, lb/day, etc.). More than one regulatory standard will often apply to a unit for a particular pollutant, list all that apply. Enter the regulatory citation(s) for the standard(s).

NOTE: The applicant should be aware of any existing regulatory standard applicable to the unit and should not propose allowable emissions in excess of the regulatory standard(s).

Pollutant	Regulatory Standard(s) *(specify units)*	Proposed Allowable Emissions *(specify units)*	Regulatory Citation(s)
Criteria Air Pollutants			
PM			
PM_{10}			
$PM_{2.5}$ Total (filterable + condensable)			
SO_x	0.06 lb/MMBtu	0.0015 lb/MMBtu	40 CFR 60.4320(a)
NO_x	15 ppmvd @ 15% O2	2.0 ppmvd @ 15% O2	40 CFR 60.4330(a)(2)
CO			
VOC			
Pb			
GHG			
Hazardous or Other Air Pollutants *(Standards other than RCSA §22a-174-29)*			

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E212-A, etc.) and be sure to include the applicant's name.

☒	Attachment E212-A:	*Sample Calculations*- Submit sample calculations used to determine all emissions rates, excluding GHG. See Attachment E212-C for GHG emissions. **REQUIRED**
☒	Attachment E212-B:	*RCSA section 22a-174-29 Hazardous Air Pollutants Compliance* – Submit a completed CTMASC spreadsheet**,** or equivalent, to demonstrate compliance with RCSA section 22a-174-29. **REQUIRED**
☒	Attachment E212-C:	*Greenhouse Gas Emissions* – Submit a completed CO_2 Equivalents Calculator Spreadsheet, or equivalent, used to quantify Greenhouse Gas emissions, **REQUIRED**

Attachment E212: Unit Emissions Supplemental Application Form

Applicant Name: CPV Towantic, LLC
Unit No.: CT2 & DB2

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-212) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for *each* unit.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Unit Emission Information

Pollutant	Potential Emissions at Maximum Capacity		Proposed Allowable Emissions		
	lb/hr	tpy	lb/hr	Other Units *(specify)*	tpy
Criteria Air Pollutants					
PM	42.6	186.6		See Attached	76.7
PM_{10}	42.6	186.6		Table	76.7
$PM_{2.5}$ Total (filterable + condensable)	42.6	186.6			76.7
SO_x	6.2	27.2			19.7
NO_x	52.0	227.8			94.7
CO	13.8	60.4			64.5
VOC	8.82	38.6			24.5
Pb	3.53E-02	0.155	3.53E-02		1.7E-02
GHG	415,048	1.82E06	415,048		1,328,009
Hazardous or Other Air Pollutants					
See Appendx A					

Potential Emissions Calculation Basis: Vendor Data

Proposed Allowable Emissions Calculation Basis: Vendor Data/operating restrictions in Exec. Summary

Part II: Regulatory Standards

Enter the regulatory standard(s) and the proposed allowable emissions for each pollutant emitted by the unit using the same units (e.g., ppmvd, lb/MMBTU, lb/hour, lb/day, etc.). More than one regulatory standard will often apply to a unit for a particular pollutant, list all that apply. Enter the regulatory citation(s) for the standard(s).

NOTE: The applicant should be aware of any existing regulatory standard applicable to the unit and should not propose allowable emissions in excess of the regulatory standard(s).

Pollutant	Regulatory Standard(s) *(specify units)*	Proposed Allowable Emissions *(specify units)*	Regulatory Citation(s)
Criteria Air Pollutants			
PM			
PM_{10}			
$PM_{2.5}$ Total (filterable + condensable)			
SO_x	0.06 lb/MMBtu	0.0015 lb/MMBtu	40 CFR 60.4320(a)
NO_x	15 ppmvd @ 15% O2	2.0 ppmvd @ 15% O2	40 CFR 60.4330(a)(2)
CO			
VOC			
Pb			
GHG			
Hazardous or Other Air Pollutants *(Standards other than RCSA §22a-174-29)*			

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E212-A, etc.) and be sure to include the applicant's name.

☒	Attachment E212-A:	*Sample Calculations*- Submit sample calculations used to determine all emissions rates, excluding GHG. See Attachment E212-C for GHG emissions. **REQUIRED**
☒	Attachment E212-B:	*RCSA section 22a-174-29 Hazardous Air Pollutants Compliance* – Submit a completed CTMASC spreadsheet**,** or equivalent, to demonstrate compliance with RCSA section 22a-174-29. **REQUIRED**
☒	Attachment E212-C:	*Greenhouse Gas Emissions* – Submit a completed CO_2 Equivalents Calculator Spreadsheet, or equivalent, used to quantify Greenhouse Gas emissions, **REQUIRED**

Attachment E212: Unit Emissions Supplemental Application Form

Applicant Name: CPV Towantic , LLC
Unit No.: EG

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-212) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for *each* unit.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Unit Emission Information

Pollutant	Potential Emissions at Maximum Capacity		Proposed Allowable Emissions		
	lb/hr	tpy	lb/hr	Other Units *(specify)*	tpy
Criteria Air Pollutants					
PM	0.195	0.85		0.03 g/bhp	0.02
PM_{10}	0.195	0.85		0.03 g/bhp	0.02
$PM_{2.5}$ Total (filterable + condensable)	0.195	0.85		0.03 g/bhp	0.02
SO_x	0.022	0.095		15 ppmw S	0.003
NO_x	29.62	129.7		4.08 g/bhp	2.98
CO	3.89	17.0		0.44 g/bhp	0.32
VOC	0.73	3.20		0.11 g/bhp	0.08
Pb	1.1E-5	4.9E-05			1.7E-06
GHG	2,362	1.035E04			354
Hazardous or Other Air Pollutants					

Potential Emissions Calculation Basis: Vendor Data

Proposed Allowable Emissions Calculation Basis: Vendor Data and 300 hrs/yr

Part II: Regulatory Standards

Enter the regulatory standard(s) and the proposed allowable emissions for each pollutant emitted by the unit using the same units (e.g., ppmvd, lb/MMBTU, lb/hour, lb/day, etc.). More than one regulatory standard will often apply to a unit for a particular pollutant, list all that apply. Enter the regulatory citation(s) for the standard(s).

NOTE: The applicant should be aware of any existing regulatory standard applicable to the unit and should not propose allowable emissions in excess of the regulatory standard(s).

Pollutant	Regulatory Standard(s) *(specify units)*	Proposed Allowable Emissions *(specify units)*	Regulatory Citation(s)
Criteria Air Pollutants			
PM	0.15 g/bhp	0.03 g/bhp	40 CFR 60.4202(a)(2)
PM_{10}	0.15 g/bhp	0.03 g/bhp	40 CFR 60.4202(a)(2)
$PM_{2.5}$ Total (filterable + condensable)	0.15 g/bhp	0.03 g/bhp	40 CFR 60.4202(a)(2)
SO_x			
NO_x	4.77 g/bhp	4.08 g/bhp	40 CFR 60.4202(a)(2)
CO	2.61 g/bhp	0.44 g/bhp	40 CFR 60.4202(a)(2)
VOC	0.97 g/bhp	0.11 g/bhp	40 CFR 60.4202(a)(2)
Pb			
GHG			
Hazardous or Other Air Pollutants *(Standards other than RCSA §22a-174-29)*			

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E212-A, etc.) and be sure to include the applicant's name.

☒ Attachment E212-A: *Sample Calculations*- Submit sample calculations used to determine all emissions rates, excluding GHG. See Attachment E212-C for GHG emissions. **REQUIRED**

☒ Attachment E212-B: *RCSA section 22a-174-29 Hazardous Air Pollutants Compliance* – Submit a completed CTMASC spreadsheet**,** or equivalent, to demonstrate compliance with RCSA section 22a-174-29. **REQUIRED**

☒ Attachment E212-C: *Greenhouse Gas Emissions* – Submit a completed CO_2 Equivalents Calculator Spreadsheet, or equivalent, used to quantify Greenhouse Gas emissions, **REQUIRED**

Attachment E212: Unit Emissions Supplemental Application Form

Applicant Name: CPV Towantic , LLC
Unit No.: FP

DEEP USE ONLY
App. No.: ____________

Complete this form in accordance with the instructions (DEEP-NSR-INST-212) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for *each* unit.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Part I: Unit Emission Information

Pollutant	Potential Emissions at Maximum Capacity		Proposed Allowable Emissions		
	lb/hr	tpy	lb/hr	Other Units *(specify)*	tpy
Criteria Air Pollutants					
PM	0.09	0.40		0.13 g/kW-hr	0.014
PM_{10}	0.09	0.40		0.13 g/kW-hr	0.014
$PM_{2.5}$ Total (filterable + condensable)	0.09	0.40		0.13 g/kW-hr	0.014
SO_x	3.7E-03	0.016			0.0006
NO_x	2.64	11.6		3.8 g/kW-hr	0.40
CO	0.63	2.74		0.9 g/kW-hr	0.094
VOC	0.069	0.30		0.1 g/kW-hr	0.010
Pb	1.9E-06	8.3E-06			2.8E-07
GHG	401	1,756			60
Hazardous or Other Air Pollutants					

Potential Emissions Calculation Basis: **Vendor Data**

Proposed Allowable Emissions Calculation Basis: **Vendor Data and 300 hrs/yr**

Part II: Regulatory Standards

Enter the regulatory standard(s) and the proposed allowable emissions for each pollutant emitted by the unit using the same units (e.g., ppmvd, lb/MMBTU, lb/hour, lb/day, etc.). More than one regulatory standard will often apply to a unit for a particular pollutant, list all that apply. Enter the regulatory citation(s) for the standard(s).

NOTE: The applicant should be aware of any existing regulatory standard applicable to the unit and should not propose allowable emissions in excess of the regulatory standard(s).

Pollutant	Regulatory Standard(s) *(specify units)*	Proposed Allowable Emissions *(specify units)*	Regulatory Citation(s)
Criteria Air Pollutants			
PM	0.2 g/kW-hr	0.13 g/kW-hr	40 CFR 60.4205(c)
PM_{10}	0.2 g/kW-hr	0.13 g/kW-hr	40 CFR 60.4205(c)
$PM_{2.5}$ Total (filterable + condensable)	0.2 g/kW-hr	0.13 g/kW-hr	40 CFR 60.4205(c)
SO_x			
NO_x	4.0 g/kW-hr (NOx + VOC)	3.8 g/kW-hr	40 CFR 60.4205(c)
CO	3.5 g/kW-hr	0.9 g/kW-hr	40 CFR 60.4205(c)
VOC	4.0 g/kW-hr (NOx + VOC)	0.1 g/kW-hr	40 CFR 60.4205(c)
Pb			
GHG			
Hazardous or Other Air Pollutants *(Standards other than RCSA §22a-174-29)*			

Part III: Attachments

Please check the attachment being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment E212-A, etc.) and be sure to include the applicant's name.

☒	Attachment E212-A:	*Sample Calculations*- Submit sample calculations used to determine all emissions rates, excluding GHG. See Attachment E212-C for GHG emissions. **REQUIRED**
☒	Attachment E212-B:	*RCSA section 22a-174-29 Hazardous Air Pollutants Compliance* – Submit a completed CTMASC spreadsheet**,** or equivalent, to demonstrate compliance with RCSA section 22a-174-29. **REQUIRED**
☒	Attachment E212-C:	*Greenhouse Gas Emissions* – Submit a completed CO_2 Equivalents Calculator Spreadsheet, or equivalent, used to quantify Greenhouse Gas emissions, **REQUIRED**

ATTACHMENT F – PREMISES INFORMATION FORM

Provided on the following pages is a completed Premises Information form (DEEP-APP-217).

Attachment F: Premises Information Form

Applicant Name: CPV Towantic, LLC

DEEP USE ONLY
App. No.:

Complete this form in accordance with the instructions (DEEP-NSR-INST-217) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete Parts I through VI of this form, as applicable, for only the equipment which is located at the premises prior to the submittal of this application package. Unit(s) or modifications that are the subject of this application package are addressed in Part VII of this form.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152

Note: This form is not required if you indicated in Part IV.8 of the *Permit Application for Stationary Sources of Air Pollution New Source Review Form (DEEP-NSR-APP-200) that* the premises is operating under the General Permit to Limit Potential to Emit.

Part I: Premises Information Summary

Answer each question unless directed to do otherwise. Complete the Part(s) indicated as well as Part VII.

Question	Check One	If Yes….
A. Is this a new premises? (i.e. no air pollution emitting equipment on site)	☒ Yes ☐ No	Skip Questions B through G and continue on to Part VII of this form.
B. Is the premises operating under a Title V permit?	☐ Yes ☐ No	Permit Number: Issue Date: Skip Questions C through G and continue on to Part VII of this form.
C. Is there any equipment operating under a New Source Review Permit (permit) or Air Registration (registration) at the premises?	☐ Yes ☐ No	Complete Part II of this form.
D. Are there any external combustion units, automotive refinishing operations, nonmetallic mineral processing equipment, emergency engines or surface coating operations operating under RCSA section 22a-174-3b at the premises?	☐ Yes ☐ No	Complete Part III of this form.
E. Are there any external combustion units, automotive refinishing operations, nonmetallic mineral processing equipment, emergency engines or surface coating operations operating under RCSA section 22a-174-3c at the premises?	☐ Yes ☐ No	Complete Part IV of this form.
F. Are there any emissions units operating at the premises that have potential emissions of any air pollutant below the permitting thresholds of RCSA section 22a-174-3a which have not been captured in Question E?	☐ Yes ☐ No	Complete Part V of this form.
G. Is the premises operating under a premises-wide annual limitation (other than GPLPE or RCSA section 22a-174-3c) for any air pollutant?	☐ Yes ☐ No	Complete Part VI of this form.

Part II: Permits and Registrations

Complete this part, if “Yes” was answered to Question C in Part I of this form. List each piece of equipment operating under a permit or registration located at this premises. Provide the potential emissions for each pollutant as limited by such permit or registration in tons per year for each unit. Calculate the total potential emissions from equipment operating under permits or registrations for the premises.

Permit / Registration Number	Equipment Description	Permit/Registration Issuance Date	Potential Emissions from Permit or Registration (tpy)								
			PM	PM_{10}	$PM_{2.5}$*	SO_x	NO_x	VOC	CO	Pb	GHG
Totals											

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

Part III: Units Operating Under RCSA section 22a-174-3b

Complete this part, if "Yes" was answered to Question D in Part I of this form. Enter the following information for each unit operating under RCSA section 22a-174-3b. Such units may include external combustion units, automotive refinishing operations, nonmetallic mineral processing equipment, emergency engines or surface coating operations. Calculate the total potential emissions from the equipment as limited by RCSA section 22a-174-3b.

Equipment Type	Const. Date	Maximum Rated Capacity of Equipment	Potential Emissions as Limited by RCSA section 22a-174-3b (tpy)								
			PM	PM_{10}	$PM_{2.5}$*	SO_x	NO_x	VOC	CO	Pb	GHG
Totals											

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

Emissions Calculation Basis: ____

Part IV: Units Operating Under RCSA section 22a-174-3c

Complete this part, if "Yes" was answered to Question E in Part I of this form. Check off the types of equipment that is operating at the premises under RCSA section 22a-174-3c. Check all that apply. Calculate the total potential emissions from the equipment limited by RCSA section 22a-174-3c for each pollutant.

<table>
<tr><th colspan="2">Equipment Operating Under RCSA section 22a-174-3c
(Check all that apply)</th><th>Fuels Used
(Check all that apply)</th><th>Number of Fuels Used</th><th>Potential Emissions for Each Pollutant (tpy)</th><th>Total Potential Emissions for Each Pollutant (tpy)</th></tr>
<tr><td>External Combustion Unit</td><td>☐</td><td rowspan="2">☐ Gaseous Fuel
☐ Distillate Oil or a blend of distillate oil and biodiesel fuel
☐ Residual Oil or a blend of residual oil and biodiesel fuel (boiler only)
☐ Propane</td><td rowspan="2"></td><td rowspan="2">15</td><td rowspan="2"></td></tr>
<tr><td>Emergency Engine</td><td>☐</td></tr>
<tr><td>Nonmetallic Mineral Processing Equipment</td><td>☐</td><td>N/A</td><td>N/A</td><td>15</td><td></td></tr>
<tr><td>Automotive Refinishing Operation</td><td>☐</td><td>N/A</td><td>N/A</td><td>15</td><td></td></tr>
<tr><td>Surface Coating Operation</td><td>☐</td><td>N/A</td><td>N/A</td><td>15</td><td></td></tr>
<tr><td colspan="5">Totals for Each Pollutant (tpy)</td><td></td></tr>
</table>

Potential emissions of any individual air pollutant for a stationary source operating under RCSA section 22a-174-3c is less than 15 tons per year unless otherwise determined by a permit or order. Please be aware that if different units are operating with the same fuel, the most stringent limitation for that fuel applies to the premises.

Part V: Other Equipment

Complete this part, if “Yes” was answered to Question F in Part I of this form. Only include units which have not been captured elsewhere on this form and have potential emissions between 5 and 15 tons per year of any individual pollutant. If it is determined that premises-wide annual emissions of a pollutant are within 90% of major source thresholds, include all units with potential emissions greater than one ton per year on this table. Calculate the total potential emissions.

Equipment Description	Const. Date	Maximum Rated Capacity of Equipment	Potential Emissions as Defined in RCSA section 22a-174-1(91) (tpy)								
			PM	PM_{10}	$PM_{2.5}$*	SO_x	NO_x	VOC	CO	Pb	GHG
Totals											

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

Emissions Calculation Basis: ____

Part VI: Premises-Wide Annual Limitations

Complete this part, if “Yes” was answered to Question G in Part I of this form. List all premises-wide annual limitations applicable to this premises that appear in a permit or order. **Do not include limitations under RCSA section 22a-174-3c.**

Permit or Order Number	Pollutant Limited	Enforceable Premises-Wide Limitation (tpy)

Part VII: Premises Summary

Ozone Non-Attainment Status: ☒ **Serious** ☐ **Severe**

$PM_{2.5}$ Attainment Status: ☒ **Attainment** ☐ **Non-Attainment**

A. Current Premises Potential Emissions

List the applicable potential emissions totals from Parts II through VI, if required to complete those sections. Calculate the *Total Current Premises Potential Emissions* applying any applicable premise-wide limitations. A source that answered "Yes" to Question A or B in Part I of this form would only complete the last three rows of the table below.

Form Part	Part Description	Potential Emissions (tpy)								
		PM	PM_{10}	$PM_{2.5}$*	SO_x	NO_x	VOC	CO	Pb	GHG
Part II	Total Potential Emissions as Limited by Permit or Registration									
Part III	Total Potential Emissions as Limited by RCSA section 22a-174-3b									
Part IV	Total Potential Emissions as Limited by RCSA section 22a-174-3c									
Part V	Total Potential Emissions from Other Sources									
Part VI	Applicable Premises-Wide Annual Limitations									
Total Current Premises Potential Emissions										
Major Source Thresholds (severe/serious)		100	100	100	100	25/50	25/50	100	100	100,000
Existing Major Stationary Source?		☐	☐	☐	☐	☐	☐	☐	☐	☐

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

If any pollutant is checked above**,** this premises **is** an existing major stationary source.

If no pollutants are checked above, this premises **is not** an existing major stationary source.

Go on to Part VII.B.

B. Proposed Project Allowable Emissions

List the proposed allowable emissions from the proposed project for the equipment or modifications included in this application package from *Attachment E: Unit Emissions (DEEP-AIR-APP-212)*.

Totals	Pollutant Emissions (tpy)								
	PM	PM_{10}	$PM_{2.5}$ *	SO_x	NO_x	VOC	CO	Pb	GHG
Proposed Allowable Emissions	154.7	154.7	154.7	39.7	194.7	49.9	136.2	0.03	2,678,612
Major Source Thresholds (severe/serious)	**100**	**100**	**100**	**100**	**25/50**	**25/50**	**100**	**100**	**100,000**
Project Major Source?	☒	☒	☒	☐	☒	☐	☒	☐	☒

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

If any pollutant is checked above, the proposed project **is** major in and of itself.

If no pollutants are checked above, the project **is not** major in and of itself.

Go on to Part VII.C.

C. New Premises Total Emissions

List the *Current Premises Potential Emissions* and the *Proposed Allowable Emissions* values from Parts VII.A and B. Calculate the *New Premises Total Emissions*.

Totals	Pollutant Emissions (tpy)								
	PM	**PM_{10}**	**$PM_{2.5}$***	**SO_x**	**NO_x**	**VOC**	**CO**	**Pb**	**GHG**
Total Current Premises Potential Emissions (Part VII.A)	0	0	0	0	0	0	0	0	0
Proposed Allowable Emissions (Part VII.B)	154.7	154.7	154.7	39.7	194.7	49.9	136.2	0.03	2,678,612
New Premises Total Emissions	154.7	154.7	154.7	39.7	194.7	49.9	136.2	0.03	2,678,612
Major Source Thresholds (severe/serious)	**100**	**100**	**100**	**100**	**25/50**	**25/50**	**100**	**100**	**100,000**
Premises Major Source After Project?	☒	☒	☒	☐	☒	☐	☒	☐	☒

* $PM_{2.5}$ should include filterable $PM_{2.5}$ plus condensable $PM_{2.5}$

If any pollutant is checked above, the premises **will be** considered a major stationary source after the approval of the proposed project.

If no pollutants are checked above, the premises **will not be** considered a major stationary source after the approval of the proposed project.

Go on to Part VII.D**.**

D. Form Requirements

Based on the results in Parts VII.A through VII.C of this form the following forms are required to be completed for each pollutant:

Premises Major Stationary Source?	Project Itself Major Stationary Source?	Premises After Project is Major Stationary Source?	Forms Required to Be Completed
Part VII.A	**Part VII.B**	**Part VII.C**	
Yes	**Yes**	**--**	• Attachment H: Major Modification Determination Form • Attachment I: Prevention of Significant Deterioration of Air Quality (PSD) Program Form • Attachment J: Non-Attainment Review Form (for NOx, VOC or $PM_{2.5}$ only)
Yes	**No**	**--**	• Attachment H: Major Modification Determination Form (This form will direct you to complete Attachments I or J, if required.)
No	**Yes**	**--**	• Attachment I: Prevention of Significant Deterioration of Air Quality (PSD) Program Form • Attachment J: Non-Attainment Review Form (for NOx, VOC or $PM_{2.5}$ only)
No	**No**	**--**	Attachments H, I and J are not required.
--	**--**	**Yes**	If not already operating under one, the applicant is required to apply for a Title V permit within 12 months of becoming a major stationary source or the applicant must limit premises potential emissions by obtaining an approval of registration to operate under the General Permit to Limit Potential to Emit (GPLPE).

ATTACHMENT G – BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The following supplemental BACT forms are provided with this application. Attachment G2, Cost/Economic Impact Analysis form DEEP-NSR-APP-214c, was only completed for those sources and pollutants for which the top-level of control was not selected.

- Attachment G - Analysis of Best Available Control Technology (DEEP-NSR-APP-214a)
    - AB – CO Emissions
    - AB – NO_x Emissions
    - AB – VOC Emissions
    - AB – PM Emissions
    - AB – SO_2 Emissions
    - AB – GHGs Emissions
    - AB – H_2SO_4 Emissions
    - CT#1 / DB#1 – CO Emissions
    - CT#1 / DB#1 – NO_x Emissions
    - CT#1 / DB#1 – VOC Emissions
    - CT#1 / DB#1 – PM Emissions
    - CT#1 / DB#1 – SO_2 Emissions
    - CT#1 / DB#1 – GHGs Emissions
    - CT#1 / DB#1 – H_2SO_4 Emissions
    - CT#1 / DB#1 – NH_3 Emissions
    - CT#2 / DB#2 – CO Emissions
    - CT#2 / DB#2 – NO_x Emissions
    - CT#2 / DB#2 – VOC Emissions
    - CT#2 / DB#2 – PM Emissions
    - CT#2 / DB#2 – SO_2 Emissions
    - CT#2 / DB#2 – GHGs Emissions
    - CT#2 / DB#2 – H_2SO_4 Emissions
    - CT#2 / DB#2 – NH_3 Emissions
- Attachment G1 - Background Search - Existing BACT Determinations (DEEP-NSR-APP-214b)
- Attachment G2 - Cost/Economic Impact Analysis (DEEP-NSR-APP-214c)
    - Auxiliary Boiler – CO Emissions
    - Auxiliary Boiler – NO_x Emissions
    - Auxiliary Boiler – VOC Emissions

    - Combustion Turbine #1/ Duct Burner #1 / Combustion Turbine #2/Duct Burner #2 – GHG Emissions

- Attachment G3 - Summary of Best Available Control Technology Review (DEEP-NSR-APP-214d)

Also provided is a control technology analysis to satisfy both the LAER and BACT requirements of the Project.

LOWEST ACHIEVABLE EMISSION RATE ANALYSIS

The Project is located in an area designated as non-attainment for ozone (O_3) and has potential NO_x emissions above the new source major source threshold. Therefore, the Project must implement LAER controls to minimize NO_x emissions.

Definition of LAER

LAER is defined under 40 Code of Federal Regulations (CFR) 51.165(a)(1)(xiii) as the more stringent rate of emissions based on the following:

1. The most stringent emissions limitation which is contained in the implementation plan of any State for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or
2. The most stringent emissions limitation which is achieved in practice by such class or category of stationary sources. In no event shall the application of the term permit a proposed new or modified stationary source to emit any pollutant in excess of the amount allowable under an applicable new source standard of performance.

LAER Process

As noted above, LAER is the more stringent of any limitation in a state's approved implementation plan or an emissions limitation which is achieved in practice by such class or category of stationary sources. For combined-cycle combustion turbine projects, the most stringent NO_x emissions can be found in previously permitted projects subject to PSD or NNSR requirements. In order to identify the "most stringent emissions limitation which is achieved in practice" by a combined-cycle combustion turbine facility, numerous sources of information were evaluated. These sources included the following:

- USEPA's Reasonably Achievable Control Technology (RACT), BACT, LAER Clearinghouse (RBLC);
- The California Air Resources Board (CARB) BACT Clearinghouse;
- USEPA regional air permitting websites; and
- State environmental agency websites.

In addition to these sources of information, additional publicly available information obtained through Tetra Tech's experience, such as permits for individual projects not listed in the RBLC or agency websites, were also included in the analysis. This research was conducted for the Project's emission sources that emit NO_x including:

- Combined-cycle-combustion turbines and duct burners;
- Auxiliary boiler; and
- Emergency engines.

Following is a summary of the LAER determination for NO_x emissions for each of the above listed emission sources.

Combined-Cycle Combustion Turbines and Duct Burners

The LAER analysis for the combustion turbines and duct burners is combined, as the duct burners cannot operate without the combustion turbines in operation. Since the combustion turbines can operate with and without duct firing, LAER emission rates were reviewed for both of these operating scenarios. Provided in Table G-1 is a summary of recently permitted BACT and LAER NO_x emission limits for combined-cycle combustion turbine projects larger than 100 MW firing natural gas and, to the extent available, ULSD backup. Projects with LAER permitted emission rates are noted as such in the table.

Table G-1: Combustion Turbine BACT and LAER NO_x Rate Emission Limits

Facility	Location	Permit Date	Turbine	NO_x[a,b] (ppm)
Green Energy Partners / Stonewall	Leesburg, VA	04/30/2013	GE 7FA	2.0 (w/ and w/o DF) LAER
Brunswick County Power	Freeman, VA	05/23/2012	Mitsubishi M501 GAC	2.0 (w/ and w/o DF)
Carroll County Energy	Washington Twp., OH	11/5/2013	GE 7FA	2.0 (w/ and w/o DF)
Renaissance Power	Carson City, MI	11/1/2013	Siemens 501 FD2	2.0 (w/ and w/o DF)
Langley Gulch Power	Payette, ID	08/14/2013	Siemens SGT6-5000F	2.0 (w/ and w/o DF)
Kleen Energy (gas firing)	Middletown, CT	02/25/2008	Siemens SGT6-5000F	2.0 (w/ and w/o DF)
Kleen Energy (ULSD firing)	Middletown, CT	02/25/2008	Siemens SGT6-5000F	5.9 (w/ and w/o DF)
Oregon Clean Energy	Oregon, OH	06/18/2013	Siemens SCC6-8000H	2.0 (w/ and w/o DF)
TECO Polk Power 2	Mulberry, FL	05/15/2013	GE 7FA	2.0 (w/ and w/o DF)
Hess Newark Energy	Newark, NJ	11/01/2012	GE 7FA.05	2.0 (w/ and w/o DF) LAER
Cricket Valley Energy Center	Dover, NY	09/27/2012	"F" Class	2.0 (w/ and w/o DF) LAER
Pioneer Valley Generation Company (gas firing)	Westfield, MA	04-12-2012	Mitsubishi 501G	2.0 (w/o DF) LAER
Pioneer Valley Generation Company (ULSD firing)	Westfield, MA	04-12-2012	Mitsubishi 501G	5.0 (w/o DF) LAER

[a] Concentration in ppm is parts per million by volume, dry, at 15 percent O_2.
[b] DF refers to duct firing

The permitted NO_x emission rate during natural gas firing for all of the projects in Table G-1 is 2.0 ppmvd at 15% O_2 including a wide range of turbine models and sizes. This emission rate has been achieved in practice at several facilities, including the Kleen Energy facility in Connecticut. For these reasons, LAER for NO_x emissions from the two combined-cycle combustion turbines and duct burners was selected as 2.0 ppmvd at 15% O_2 during natural gas firing for all modes of operation.

For oil firing emission limits, there are far fewer recently permitted combined-cycle combustion turbine projects. The Pioneer Valley Generation project includes firing of ULSD as backup fuel and was required to meet LAER for NO_x emissions. The permitted NO_x emission rate for ULSD firing for the Pioneer Valley Generation project is 5.0 ppmvd at 15% O_2. The most recent Connecticut project (Kleen Energy) is permitted at 5.9 ppmvd during ULSD firing. The GE NO_x emissions guarantee for the Model 7HA01 firing ULSD with installation of SCR and oxidation catalyst controls is 5.0 ppmvd at 15% O_2. This emission level is at or below the lowest permitted limits for oil firing and no additional control measures are available to reduce NO_x emissions from the combined-cycle combustion turbines and duct burners. For these reasons, LAER for NO_x emissions for ULSD firing was selected as 5.0 ppmvd at 15% O_2.

Auxiliary Boiler

Provided in Table G-2 is a summary of recently permitted BACT and LAER NO_x emission limits for auxiliary boilers rates less than 100 MMBtu/hr firing natural gas. Projects with LAER permitted emission rates are noted as such in the table.

Table G-2: Auxiliary Boiler BACT and LAER NO_x Rate Emission Limits

Facility	Location	Permit Date	Controls[a]	NO_x[b] (ppm)
Green Energy Partners / Stonewall	Leesburg, VA	04/30/2013	Ultra LNB	9.0 (LAER)
Brunswick County Power	Freeman, VA	05/23/2012	Ultra LNB	9.0
Carroll County Energy	Washington Twp., OH	11/5/2013	LNB	16.4
Renaissance Power	Carson City, MI	11/1/2013	LNB	30
Kleen Energy	Middletown, CT	02/25/2008	LNB	37
Oregon Clean Energy	Oregon, OH	06/18/2013	LNB	16.4
Hess Newark Energy	Newark, NJ	11/01/2012	Ultra LNB	9.0
Cricket Valley Energy Center	Dover, NY	09/27/2012	Ultra LNB	9.0

[a]LNB = low NO_x burner.
[b] Concentration in ppm is parts per million by volume, dry, at 3 percent O_2.

The proposed auxiliary boiler will fire natural gas as the sole fuel and will be equipped with ultra low-NO_x burners; this is the most stringent level of control identified in Table G-2. The vendor guaranteed NO_x emission rate for this control scenario are 9.0 ppmvd at 3% O_2. The vendor guaranteed NO_x emission rate is equal to the lowest permitted emission rate in Table G-2. For these reasons, LAER for NO_x emissions from the auxiliary boiler was selected as 9.0 ppmvd at 3% O_2.

Emergency Engines

The Project will include a diesel-fired emergency generator engine and a diesel-fired fire pump engine. These engines are subject to the NO_x and non-methane hydrocarbon emission standards under New Source Performance Standard (NSPS) Subpart IIII. A review of previously permitted projects did not identify any emergency engines permitted below the NSPS Subpart IIII emission standards. To satisfy LAER for the emergency engines, the Project will install engines that meet the NSPS Subpart IIII emission standards. These engines will also be operated in accordance with Section 22a-174-3b(e) of the Connecticut regulations including firing ULSD and limiting operation to no more than 300 hours during any 12 month rolling period for each engine.

BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

The Project must install PSD BACT controls for emissions of NO_x, VOC, CO, $PM/PM_{10}/PM_{2.5}$, H_2SO_4, and GHGs. Additionally, DEEP BACT must be satisfied for SO_2 and NH_3 emissions. For NO_x emissions, LAER controls will be installed, which are by definition the top level of control available and, therefore, satisfy BACT requirements. The following control technology analysis satisfies the BACT requirements for VOC, CO, $PM/PM_{10}/PM_{2.5}$, H_2SO_4, GHGs, SO_2 and NH_3 emissions for the Project.

Definition of BACT

The DEEP regulations define BACT under Section 22a-174-1 as:

> *"an emission limitation, including a limitation on visible emissions, based upon the maximum degree of reduction for each applicable air pollutant emitted from any proposed stationary source or modification which the commissioner, on a case-by-case basis, determines is achievable in accordance with section 22a- 174-3a of the Regulations of Connecticut State Agencies. BACT may include, without limitation, the application of production processes, work practice standards or available methods, systems, and techniques, including fuel cleaning or treatment, the use of clean fuels, or innovative techniques for the control of such air pollutant."*

When determining whether or not an emission limitation is achievable, the DEEP must take into account the following factors in accordance with Section 22a-174-3a(j):

1. A previous BACT approval for a similar or a representative type of source;
2. Technological limitations; and
3. Energy, economic and environmental impacts.

In no event shall the application of BACT result in emissions of any pollutant greater than an emission standard pursuant to 40 CFR Parts 60 and 61 or any State Implementation Plan (SIP).

BACT Process

The USEPA provides guidance for conducting a BACT analysis in which all control technologies for a subject pollutant and emission source are identified and ranked from most to least efficient. An evaluation of each technology is then conducted to determine if it is technically feasible for the proposed project and if so, the resulting energy, environmental and economic impacts from its application. The most efficient technology that is determined to be technically feasible and does not result in adverse energy, environmental and/or economic impacts, is selected as BACT.

The BACT process is described in USEPA's draft document titled "*New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting*" (NSR Manual) (USEPA, 1990), which acts as a non-binding guidance document for USEPA, state permitting authorities and permit applicants during the permitting process. The process involves the following steps:

- Step 1: Identify all potential control technologies applicable to the pollutant and process.
- Step 2: Determine the technical feasibility of each control technology identified under Step 1 as applicable to the Project and eliminate those that are infeasible.

- Step 3: Rank the technically feasible control technologies based on overall control efficiency.
- Step 4: Evaluate the most effective control technology based on economic, energy, and environmental factors. If the most effective control technology causes unacceptable economic, energy, and/or environmental impacts, the next most effective technology is evaluated. This process continues until a technology is selected as BACT.
- Step 5: Select the most effective option not eliminated in Steps 2 – 4 above as BACT and determine the corresponding emission limit for the subject pollutant and emission source.

Per this guidance, if a project elects to implement the most efficient level of control that is technically feasible as identified in Steps 1 and 2, then no further analysis is required.

Sources Reviewed To Identify BACT

Steps 1 and 2 in the BACT process are the identification of all available control technologies and the top level of control for each subject pollutant from each source type for a given project. Per USEPA guidance, BACT may be achieved from a change in raw materials, a process modification, and/or add-on pollution controls. For the Project, the cleanest raw materials (natural gas and ULSD) and lowest emitting fossil-fuel generating process (combined-cycle combustion turbines) have been selected. Therefore, the identification of the top level of control focused on add-on pollution controls.

Per USEPA guidance, BACT is expressed as an emission rate and the top level of control is determined from the following:

- The most stringent emissions limitation which is contained in any SIP for such class or category of stationary source; or
- The most stringent emissions limitation which is achieved in practice by such class or category of stationary source.

In order to identify the "most stringent emissions limitation which is achieved in practice" by a combined-cycle combustion turbine facility, numerous sources of information were evaluated. These sources included the following:

- USEPA's RBLC;
- The CARB BACT Clearinghouse;
- USEPA regional air permitting websites; and
- State environmental agency websites.

In addition to these sources of information, additional publicly available information obtained through Tetra Tech's experience, such as permits for individual projects not listed in the RBLC or agency websites, were also included in the analysis. This research was conducted for the Project's emission sources that emit VOC, CO, $PM/PM_{10}/PM_{2.5}$, H_2SO_4, GHGs, SO_2 and NH_3 including:

- Combined-cycle combustion turbines and duct burners;
- Auxiliary boiler;
- Emergency engines; and
- Fugitive GHG emissions.

Combined-Cycle Combustion Turbines and Duct Burners

The BACT analysis for the combustion turbines and duct burners is combined as the duct burners cannot operate without the combustion turbines in operation. Since the combustion turbines can operate with and without duct firing, BACT emission rates were reviewed for both of these operating scenarios. Provided in Table G-3 is a summary of recently permitted VOC, CO, PM/PM_{10}/$PM_{2.5}$, GHGs and NH_3 emission limits for combined-cycle combustion turbine projects larger than 100 MW. The emission limits provided in Table G-3 serve as the basis for determining the “most stringent emissions limitation which is achieved in practice” for large combined-cycle combustion turbines.

Volatile Organic Compounds

VOC is emitted from combustion turbines and duct burners as a result of incomplete oxidation of the fuel. VOC emissions can be minimized by the use of proper combustor design and good combustion practices. Additional reductions in VOC emissions may be achieved through application of an oxidiation catalyst. All of the permitted VOC emission rates are based upon the turbine vendor guaranteed emission rate with installation of an oxidation catalyst.

The GE guaranteed maximum VOC emission rate for their Model 7AH.01 equipped with an oxidation catalyst is 1.0 ppmvd at 15% O_2 without duct firing and 2.0 ppmvd at 15% O_2 with duct firing. These VOC emission rates are consistent with the recently permitted emission rates listed in Table G-3, including the VOC LAER for Green Energy Partners and Cricket Valley Energy. These emission rates represent the lowest vendor emission guarantees provided for the GE Model 7HA.01 and will be achieved through good combustion practices and an oxidation catalyst. No additional control measures are available to reduce VOC emissions from the combined-cycle combustion turbines and duct burners. For these reasons, BACT for VOC emissions from the two combined-cycle combustion turbines and duct burners was selected as 1.0 ppmvd at 15% O_2 without duct firing and 2.0 ppmvd at 15% O_2 with duct firing.

For oil firing emission limits, there are far fewer recently permitted combined-cycle combustion turbine projects. The Pioneer Valley Generation project includes firing of ULSD and was required to meet state BACT requirements for VOC emissions. The permitted VOC emission rate for oil firing of the Pioneer Valley Generation project is 6.0 ppmvd at 15% O_2. The Kleen Energy project was permitted at a lower VOC emission rate for oil firing at 3.6 ppmvd at 15% O_2. The GE VOC emission guarantee for the Model 7HA.01 firing ULSD with installation of an oxidation catalyst is 2.0 ppmvd at 15% O_2. This emission level is below the lowest permitted limits for oil firing and no additional control measures are available to reduce VOC emissions from the combined-cycle combustion turbines and duct burners. For these reasons, BACT for VOC emissions for oil firing was selected as 2.0 ppmvd at 15% O_2.

Carbon Monoxide

CO is emitted from combustion turbines and duct burners as a result of incomplete oxidation of the fuel. CO emissions can be minimized by the use of proper combustor design and good combustion practices. The most stringent CO add-on pollution control technology is an oxidation catalyst, which is a passive reactor containing a platinum catalyst that oxidizes the CO to CO_2.

With the exception of the TECO Polk Power project, all of the projects listed in Table G-3 have been permitted with an oxidation catalyst to achieve the permitted CO emission levels. Accordingly, the Project is proposing to use an oxidation catalyst to control CO emissions from the combustion turbines and duct burners.

Table G-3: Combustion Turbine Permitted CO, PM, GHG and NH_3 Emission Rate Limits

Facility	Location	Permit Date	Turbine	VOC[a] (ppm)	CO[a] (ppm)	PM[b] (lb/MMBtu)	GHG (lb/MW-hr)	GHG (Btu/kw-hr)	NH_3[a] (ppm)
Green Energy Partners / Stonewall	Leesburg, VA	04/30/2013	GE 7FA	1.0 (w/o DF[c]) 2.4 (w/ DF) LAER	2.0 (w/ & w/o DF)	0.00334 (w/ & w/o DF)	903	7,340[d] (gross w/o DF) 7,780[d] (gross w/ DF)	5.0 (w/ & w/o DF)
Brunswick County Power	Freeman, VA	05/23/2012	Mitsubishi M501 GAC	0.7 (w/o DF) 1.6 (w/ DF)	1.5 (w/o DF) 2.4 (w/ DF)	0.0033 (w/o DF) 0.0047 (w/ DF)	920	7,500[d] (net w/o DF)	N/A
Carroll County Energy	Washington Twp., OH	11/5/2013	GE 7FA	1.0 (w/o DF) 2.0 (w/ DF)	2.0 (w/ & w/o DF)	0.0108 (w/o DF) 0.0078 (w/ DF)	859	7,350[d] (net w/o DF)	N/A
Renaissance Power	Carson City, MI	11/1/2013	Siemens 501 FD2	2.0 (w/ and w/o DF)	2.0 (w/ & w/o DF)	0.0042 (w/ & w/o DF)	1,000	N/A	N/A
Langley Gulch Power	Payette, ID	08/14/2013	Siemens SGT6-5000F	2.0 (w/ and w/o DF)	2.0 (w/ & w/o DF)	0.0053 (w/ & w/o DF)	N/A	N/A	5.0 (w/ & w/o DF)
Kleen Energy (gas firing)	Middletown, CT	02/25/2008	Siemens SGT6-5000F	5.0 (w/ and w/o DF)	0.9 (w/o DF) 1.7 (w/ DF)	0.0051 (w/o DF) 0.0059 (w/ DF)	N/A	N/A	2.0 (w/ & w/o DF)
Kleen Energy (ULSD firing)	Middletown, CT	02/25/2008	Siemens SGT6-5000F	3.6 (w/ and w/o DF)	1.8	0.0269	N/A	N/A	5.0 (w/ & w/o DF)
Oregon Clean Energy	Oregon, OH	06/18/2013	Siemens SCC6-8000H	1.0 (w/o DF) 1.9 (w/ DF)	2.0 (w/ & w/o DF)	0.0047 (w/o DF) 0.0055 (w/ DF)	833	7,227[d] (net w/o DF)	N/A
TECO Polk Power 2	Mulberry, FL	05/15/2013	GE 7FA	1.4 (no ox. cat)	4.1 (no ox. cat)	N/A	877	N/A	5.0 (w/ & w/o DF)
Hess Newark Energy	Newark, NJ	11/01/2012	GE 7FA.05	1.0 (w/o DF) 2.0 (w/ DF)	2.0 (w/ & w/o DF)	0.0047 (w/o DF) 0.0058 (w/ DF)	887	7,522[d] (net w/o DF)	5.0 (w/ & w/o DF)
Cricket Valley Energy Center	Dover, NY	09/27/2012	"F" Class	1.0 (w/o DF) 2.0 (w/ DF) LAER	2.0 (w/ & w/o DF)	0.005 (w/o DF) 0.006 (w/ DF)	910	7,605[d] (net w/o DF)	5.0 (w/ & w/o DF)

Facility	Location	Permit Date	Turbine	VOC[a] (ppm)	CO[a] (ppm)	PM[b] (lb/MMBtu)	GHG (lb/MW-hr)	GHG (Btu/kw-hr)	NH_3[a] (ppm)
Pioneer Valley Generation Company (gas firing)	Westfield, MA	04/12/2012	Mitsubishi 501G	1.0 (w/o DF) (state BACT)	2.0 (w/ & w/o DF)	0.0040 (w/ & w/o DF)	895 (all fuels)	N/A	2.0 (w/ & w/o DF)
Pioneer Valley Generation Company (ULSD firing)	Westfield, MA	04/12/2012	Mitsubishi 501G	6.0 (w/o DF) (state BACT)	6.0	0.014			2.0

[a] Concentration in ppm is parts per million by volume, dry, at 15 percent O_2.

[b] Concentration in pounds per million Btu heat input (HHV), except as noted, including front (filterable) and back-half (condensable) PM. All PM is considered to be $PM_{2.5}$.

[c] DF = duct firing.

[d] At full load and corrected to ISO conditions (59°F, absolute pressure of 14.696 kPa and 60% relative humidity)

A review of recently permitted projects shows that during natural gas firing, most are permitted at an emission rate at or above 2.0 ppmvd corrected to 15% O_2 on a 1-hour averaging basis during all operating periods. A few projects have marginally lower permitted limits without duct firing and one project has a lower limit with duct firing, but these projects have a different combustion turbine than the GE 7HA.01. The Kleen Energy project's lower CO BACT limit comes at the expense of VOC, for which its BACT limit is considerably higher than most limits in the RBLC database. Based upon GE guarantees, the proposed CO BACT emission rate during gas firing is 0.9 ppmvd at 15% O_2 without duct firing and 1.7 ppmvd at 15% O_2 with duct firing. Although this emission rate is marginally higher than a couple of recently permitted projects, the USEPA's Environmental Appeals Board (EAB) decision[2] on March 14, 2014 regarding the appeal of the La Paloma Energy Center, LLC PSD permit makes clear that minor differences in permitted PSD emission rates are allowable to account for different technologies, and that turbine model selection cannot be taken into account when determining BACT for a project. The proposed CO BACT emission rate during natural gas firing represents the vendor guarantee with an oxidation catalyst and is consistent with the majority of recently permitted projects.

Two CO BACT determinations for oil firing are provided in Table G-3. The Pioneer Valley Generation project is limited to 6.0 ppmvd at 15% O_2 and the Kleen Energy project is limited to 1.8 ppmvd at 15% O_2. The GE guaranteed CO emission rate for oil firing with an oxidation catalyst is 2.0 ppmvd at 15% O_2. The GE guarantee is marginally higher than the Kleen Energy CO limit which, as discussed for natural gas firing, is associated with a much higher VOC limit. Therefore, CO BACT for oil firing is proposed to be 2.0 ppmvd at 15% O_2.

SO_2 and H_2SO_4 Emissions

The most stringent level of control for SO_2 and H_2SO_4 emissions from combustion sources is the firing of pipeline quality natural gas. The USEPA defines pipeline quality natural gas in the Acid Rain regulations under 40 CFR 72.2 as natural gas that contains 0.5 grains or less of total sulfur per 100 standard cubic feet (gr S/100 scf). Therefore, BACT for SO_2 emissions from the combustion turbines is utilizing pipeline quality natural gas as the primary fuel. ULSD is proposed as backup fuel for the combustion turbines to ensure fuel availability at all times. ULSD will be fired in the emergency engines so that these emergency safety devices have a standalone source of fuel during an emergency. The sulfur content of ULSD is limited to no greater than 15 parts per million (ppm) by weight, which is nearly equivalent to the sulfur content of pipeline quality natural gas. Therefore, the selection of these fuels results in the greatest level of SO_2 reduction and represents the top level of control.

During combustion, a small percentage of SO_2 is further oxidized to sulfur trioxide (SO_3) that subsequently reacts with moisture in the exhaust to form H_2SO_4. Implementing the top level of control for SO_2 emissions is, therefore, also the top level of control for H_2SO_4 emissions.

Particulate Matter

Emissions of particulate matter result from trace quantities of ash (non-combustibles) in the fuel, products of incomplete combustion and conversion of SO_2 in the exhaust to condensable salts. Conservatively, all PM emissions from the Project are presumed to be less than 2.5 microns in size ($PM_{2.5}$) and, therefore, emissions of PM, PM_{10} and $PM_{2.5}$ are presumed to be equal for the Project. Particulate emissions are minimized by utilizing state-of-the-art combustion turbines firing fuels with the lowest sulfur and ash content. Pipeline quality natural gas has the lowest ash and sulfur content of all fossil fuels. As shown previously, the sulfur content of ULSD is nearly equivalent to that of pipeline quality natural gas and has a maximum allowable ash content of only 100 ppm by weight. ULSD firing will be limited to no more than 720 hours per 12-month period.

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[2] http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/PSD%20Permit%20Appeals%20(CAA)/687C700F9FD042F585257C9B006369CE/$File/La%20Paloma.pdf

A review of the permitted emission limits in Table G-3 shows a wide range of values on a lb/MMBtu basis. Similar to VOC emissions, the permitted PM emission limit for a combustion turbine project are dependent upon the make and model of the combustion turbine selected and the vendor guaranteed emission rate. Furthermore, turbine vendors typically have higher emissions guarantees at lower operating loads even though the emissions on a pound per hour basis are lower at the lower operating loads. A comparison of the recently permitted Green Energy Partners project in Virginia to the Carroll County project in Ohio shows a permitted PM emission rate difference of a factor of three (on a lb/MMBtu basis) for the same model GE turbine. This difference results from the Green Energy Partners permitted emission rate being at full operating load while the Carroll County limit is at minimum operating load. For purposes of establishing PM BACT for the Project, lb/MMBtu emission levels at full load will be proposed to be consistent with the majority of recently permitted projects. Higher emission levels will occur at reduced operating loads, as presented in the calculations in Appendix A.

BACT for PM emissions from the Project is proposed to be good combustion practices, the use of natural gas as the primary fuel with a maximum sulfur content of 0.5 gr S/100 scf, limited firing of ULSD and the guaranteed emission rates from GE. GE's guaranteed PM emissions on a lb/MMBtu basis change depending upon operating load and ambient conditions. In order to establish BACT as an emission rate, the following limits at full operating load are proposed for the Project, including filterable and condensable PM. The pound per hour limits are absolute maximum values while the lb/MMBtu limit represents all scenarios at full operating load, including duct firing. Therefore, higher emissions at reduced operating loads may occur in terms of lb/MMBtu but no increase in hourly mass emissions will result.

- 20.4 lbs/hr with duct firing on natural gas;
- 9.7 lbs/hr without duct firing on natural gas;
- 0.0081 lb/MMBtu at full load with duct firing on natural gas;
- 0.0041 lb/MMBtu at full load without duct firing on natural gas;
- 42.6 lbs/hr on ULSD; and
- 0.020 lb/MMBtu at full load on ULSD;

Full operating load limits are proposed to establish BACT since performance emissions testing will be conducted at full operating load. Emissions at reduced operating load will be lower on a pound per hour basis but higher on a lb/MMBtu basis. Further reductions in PM emissions from the combustion turbines are not technically feasible as there are no known combustion turbines equipped with add-on PM pollution controls.

Ammonia

NH_3 is injected into the exhaust of the combustion turbines prior to the SCR to facilitate the conversion of NO_x to nitrogen and water. A small portion of the injected NH_3 does not react with NO_x and is exhausted to the atmosphere; this unreacted NH_3 is called "ammonia slip." A review of the recently permitted emission rates in Table G-3 for ammonia show that all of the projects are permitted at 5.0 ppmvd corrected to 15% O_2 with the exception of the Pioneer Valley and Kleen Energy projects. Based upon the great majority of recently approved projects, the Project proposes BACT for NH_3 emissions from the combustion turbines to be limited to 5.0 ppm corrected to 15% O_2 during normal operation. Ammonia will not be injected until the SCR catalyst reaches the vendor recommended minimum operating temperature to ensure a high reaction efficiency and minimize ammonia slip.

Greenhouse Gases

USEPA issued a 2011 guidance document for completing GHG BACT analyses titled "*PSD and Title V Permitting Guidance for Greenhouse Gases.*"[3] This guidance is in addition to the 1990 USEPA BACT guidance document. Although the 2011 guidance document refers to the same top-down methodology described in the 1990 document, the 2011 guidance provides additional clarification and detail with regard to some aspects of the analysis. The following analysis has been conducted in accordance with both the 1990 and 2011 guidance documents.

Step 1: Identify Potentially Feasible GHG Control Options

In Step 1, the applicant must identify all "available" control options which have the potential for practical application to the emission unit and regulated pollutant under evaluation, including lower-emitting process and practices. In assessing available GHG control measures, the sources of information reviewed for all of the BACT analyses were reviewed with regard to GHG controls and emissions. For a combined-cycle combustion turbine project, potential GHG controls include the following:

1. low carbon-emitting fuels;
2. energy efficiency and heat rate; and
3. carbon capture and storage (CCS).

Each of these GHG control measures is evaluated in Step 2 of this analysis.

Step 2: Technical Feasibility of Potential GHG Control Options

Low Carbon-Emitting Fuels

Natural gas combustion generates significantly lower GHG emissions on a per unit of heat throughput than distillate oil (approximately 27% less) and coal (approximately 50% less). Use of biofuels, such as biodiesel, would reduce fossil-based carbon dioxide emissions, since biofuels are produced from recently harvested plant material rather than ancient plant material that has transformed into fossil fuel. However, biofuels are not readily available on a commercial scale. In addition, combined-cycle turbines have technical issues with biofuels that have yet to be resolved and, as a result, there are no known permitted or proposed combustion turbine projects firing biofuel. For this reason, biofuels were eliminated from consideration as BACT. Therefore, natural gas as the primary fuel represents the lowest carbon-emitting fuel commercially available for the Project. Firing of ULSD as backup fuel will be limited to no more than 720 hours per year.

Energy Efficiency and Heat Rate

USEPA's 2011 GHG permitting guidance states:

> "*Evaluation of [energy efficiency options] need not include an assessment of each and every conceivable improvement that could marginally improve the energy efficiency of [a] new facility as a whole (e.g., installing more efficient light bulbs in the facility's cafeteria), since the burden of this level of review would likely outweigh any gain in emissions reductions achieved. USEPA instead recommends that the BACT analyses for units at a new facility concentrate on the energy efficiency of equipment that uses the largest amounts of energy, since energy efficient options for such units and equipment (e.g., induced draft fans, electric water pumps) will have a larger impact on reducing the facility's emissions...*"

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[3] http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf

USEPA also recommends that permit applicants:

> *"propose options that are defined as an overall category or suite of techniques to yield levels of energy utilization that could then be evaluated and judged by the permitting authority and the public against established benchmarks...which represent a high level of performance within an industry."*

With regard to electric generation from combustion sources, the combined-cycle combustion turbine is considered to be the most efficient technology available. GHG emissions from electricity production are primarily a function of the amount of fuel burned.

Therefore, the Project's proposal to use advanced combined-cycle combustion turbine technology is the most efficient process technically available to minimize GHG emissions.

Carbon Capture and Storage

USEPA has specifically stated that carbon capture and storage (CCS) is technically achievable and must be considered in a GHG PSD BACT analysis. CCS is composed of three main components: carbon dioxide (CO_2) capture and compression, transport, and storage. While CCS is a promising technology and may be technically achievable for a specific project, USEPA has also stated that at this time, CCS will be a technically feasible BACT option only in certain limited cases.

CCS can theoretically be applied as a pre-combustion or post combustion control option. The application of CCS technology for pre-combustion control is applicable if the fuel contains significant concentrations of CO or CO_2. Potential application of pre-combustion CCS would be an Integrated Gasification Combined Cycle (IGCC) power plant or other type of gasification process. As the Project will fire pipeline quality natural gas with minimal amounts of CO and CO_2, pre-combustion CCS is not applicable to the Project.

As stated in the August 2010 *Report of the Interagency Task Force on Carbon Capture and Storage*[4], co-chaired by USEPA and the United States Department of Energy, while amine- or ammonia-based CO_2 capture technologies are commercially available, they have only been implemented in non-combustion applications (i.e., separating CO_2 from field natural gas) or relatively small-scale combustion applications (e.g., slip streams from power plants with exhaust volumes that would correspond to approximately one MW of generating capacity). Scaling up these small-scale carbon capture systems for post combustion control of a nominal 805-MW combustion turbine generating plant such as this Project would represent a very significant technical challenge. In addition, integration of these technologies with the power cycle at generating plants present significant cost and operating issues that would need to be addressed prior to widespread, cost-effective deployment of CO_2 capture. Current technologies are not ready for widespread commercial implementation primarily because they have not been demonstrated at the scale necessary to establish confidence for power plant applications. To date, United States power generating projects under consideration for using CCS technology have required significant government funding and have been targeted for coal-fired boiler plants that have exhaust with higher CO_2 concentrations and lower exhaust volume as compared to a combustion turbine project. Furthermore, these proposed projects have experienced significant delays due to technical issues and dramatic increases in costs beyond original projections.

The Interagency Task Force report also showed that the costs to implement CCS technology on a natural gas combined-cycle combustion turbine generating project were excessive. The Interagency Task Force report provided an estimated capital cost for carbon capture equipment for a 550 MW natural gas-fired combined-cycle facility of $340 million, an 80 percent increase in the capital cost of the plant. Scaling these costs up to nominal

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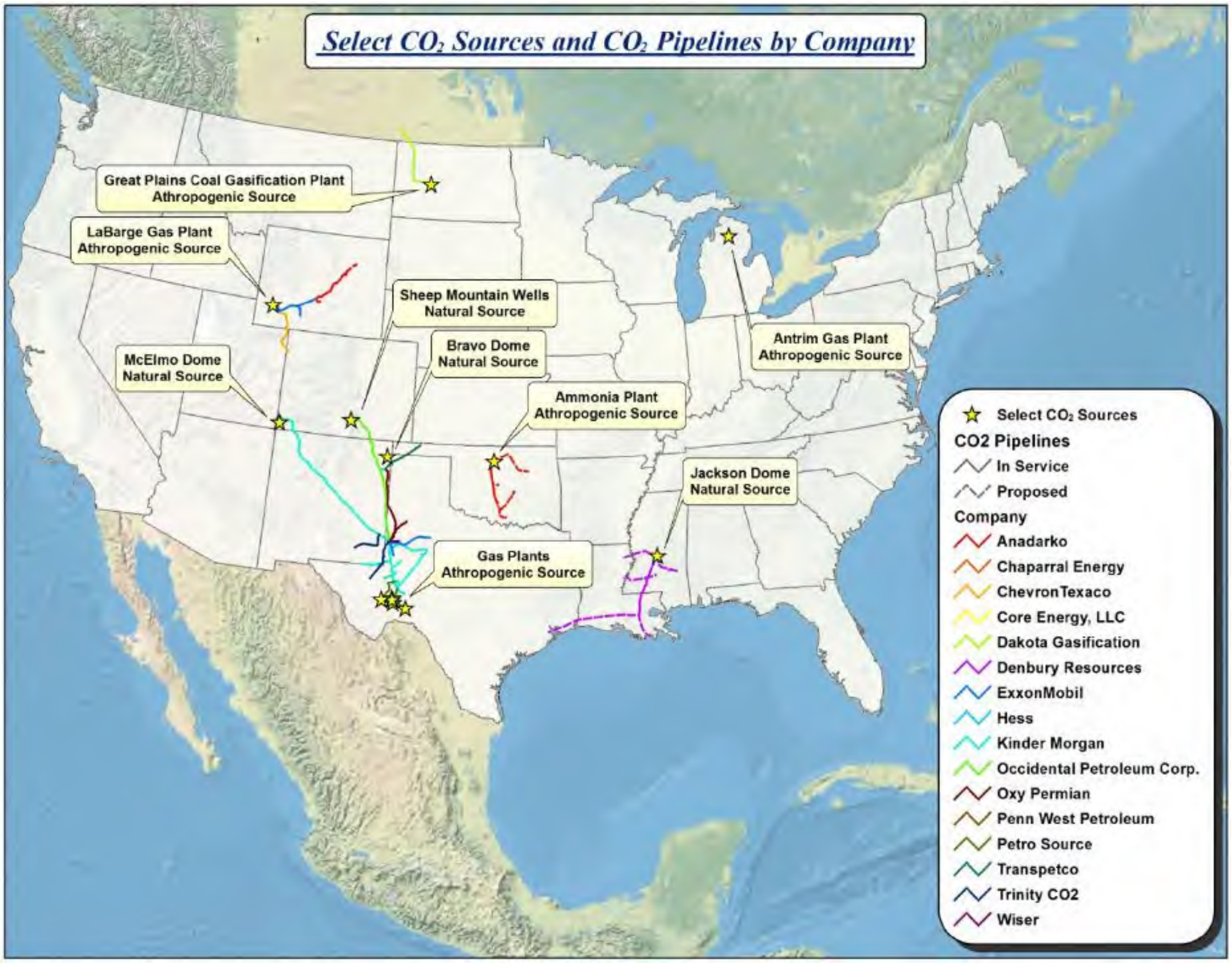
[4] http://www.epa.gov/climatechange/Downloads/ccs/CCS-Task-Force-Report-2010.pdf

805-MW for the Project yields an estimated capital cost for carbon capture equipment of approximately $498 million dollars. These costs are excessive and would make the Project economically unviable.

In addition, the Interagency Task Force report states that CCS technology would result in an energy penalty of 15 percent, meaning that 15 percent more fuel would be required to meet the design criteria of 805 MW. This would result in a 15 percent increase in emissions of all other PSD subject pollutants for the Project.

After the CO_2 is captured it must be transported to a storage facility, but a nearby pipeline does not exist to transport the captured CO_2 to a storage facility. The nearest CO_2 pipeline to the Project is in southern Mississippi; more than 1,000 miles from the Project in a straight line distance (see Figure 1). The cost to construct a pipeline from the Project to Mississippi would more than double the cost of the Project.

Figure G-1: CO_2 Pipelines in the United States



The nearest geological formation that is capable of storing CO_2 is located in western New York,[5] more than 100 miles from the Project. However, a carbon storage facility does not exist at this location. Costing procedures provided by the National Energy Technology Laboratory (NETL) in *Carbon Dioxide Transport and Storage Costs in NETL Studies*[6] (March 2013) shows that the cost to construct a 100-mile pipeline to western New York would cost $112 million dollars. Furthermore, the time necessary to acquire all required property rights, obtain regulatory approvals and construct the pipeline would take many years.

With regard to storage for CCS, the Interagency Task Force concluded that, while there is currently estimated to be a large volume of potential storage sites, "to enable widespread, safe, and effective CCS, CO_2 storage should continue to be field-demonstrated for a variety of geologic reservoir classes" and that "scale-up from a limited number of demonstration projects to wide scale commercial deployment may necessitate the consideration of basin-scale factors (e.g., brine displacement, overlap of pressure fronts, spatial variation in depositional environments, etc.)."

Based on the abovementioned USEPA guidance regarding technical feasibility, the distance to the nearest CO_2 pipeline and/or geologically suitable storage site and the conclusions of the Interagency Task Force for the CO_2 capture component alone, CCS has been determined to be not technically feasible for the Project. Furthermore, the capital costs for capture and transport equipment are estimated to be close to $600 million dollars, which would nearly double the cost of the Project and, therefore, is not cost effective.

Step 3: Ranking of Technically Feasible GHG Control Options by Effectiveness

Based on the results of Step 2, the low carbon-emitting fuels, energy efficiency and CCS are all technically feasible. However, due to the cost for carbon capture systems and the lack of suitable sequestration facilities near the Project, CCS was eliminated form further consideration as a BACT option.

Step 4: Evaluation of Low Carbon-Emitting Fuels and Energy Efficiency

The Project will utilize the lowest carbon-emitting fuel available, pipeline quality natural gas.

Improvements to energy efficiency and "heat rate" are important GHG control measures that can be employed to mitigate GHG emissions. The Project is proposing advanced combustion turbine combined-cycle technology, which is recognized as the most efficient commercially available technology for producing electric power from fossil fuels.

The driving factor in the evaluation of energy efficiency is the core efficiency of the selected combustion turbine. However, in the EAB's recent decision in the La Paloma Energy Center case it was concluded that "combined-cycle combustion turbines with efficient turbine design is the most energy efficient way to generate electricity" and that minor differences in efficiency and GHG emission rates between different combustion turbine models are acceptable. The Project is proposing to install two "H" Class turbines in combined-cycle configuration, which are the most efficient class of combustion turbines commercially available.

With regard to energy efficiency considerations in combined-cycle combustion turbine facilities, the activity with the greatest effect on overall plant efficiency is the method of condenser cooling. As with all steam-based electric generation, combined-cycle plants can use either dry cooling or wet cooling for condenser cooling. Dry cooling uses large fans to condense steam directly inside a series of pipes, similar in concept to the radiator of a car. Wet cooling can either be closed-cycle evaporative cooling (using cooling towers), or "once-through" cooling using very large volumes of water. Wet cooling performance increases overall efficiency as it produces colder water as

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[5] http://www.epa.gov/climatechange/ccs/
[6] http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Publications/QGESS_CO2T-S_Rev2_20130408.pdf

compared to dry cooling. Additionally, dry cooling requires more electricity than wet cooling, resulting in a higher parasitic load. As a result, operation of a dry cooling system requires approximately 1 to 5% more energy than a wet cooling system, depending on ambient conditions.

However, wet cooling systems utilize considerably more water than dry systems, which may not be suitable for all projects. Once-through cooling uses large quantities of water that is returned to the receiving water body at a higher temperature. Wet mechanical draft cooling towers also require a significant quantity of water, mostly due to evaporation to the atmosphere. The higher water demand of a wet cooling system is not suitable to the Project due to regional focus on minimizing water consumption. For this reason, a dry cooling system with an ACC was selected for the Project.

Step 5: GHG BACT

GHG BACT for the Project is the selection of advanced combined-cycle combustion turbine technology utilizing natural gas as the primary fuel with limited firing of ULSD.

The permitted GHG emission rates in Table G-3 take into account degradation in turbine performance over its expected lifetime. The majority of the GHG BACT decisions in Table G-3 apply several degradation factors initially established by the Bay Area Air Quality Management District for the permitting of the Russell City Energy Center. These degradation factors have been approved by the USEPA in several recent PSD permits issued by USEPA. As these degradation factors have been approved by the USEPA, they are proposed to be applied for the Project to establish the GHG BACT emission rate. Following is a discussion of these factors and the proposed GHG BACT emission rate.

The first factor accounts for design margin to reflect the likelihood that the equipment as constructed and installed may not fully achieve the optimal vendor specified design performance. A design margin of 3.3% is taken into account for this purpose.

The second factor accounts for performance margin to reflect normal wear and tear of the combustion turbine over its useful life. A performance margin of 6.0% is taken into account for this purpose.

The third factor accounts for degradation of auxiliary plant equipment to reflect normal wear and tear. An auxiliary equipment degradation margin of 3.0% is taken into account for this purpose.

These three factors are expected to compound upon each preceding factor such that the overall degradation in plant performance is estimated to be 12.8% over the useful life of the combustion turbines.

The CT DEEP has indicated that their preference is to establish GHG BACT in terms of a net heat rate. Several of the projects identified in Table G-3 have been permitted with a heat rate limit; the great majority of these limits have been established on a net output basis. Additionally, most of these limits have been established solely for a gas fired operating condition, without duct firing, at ISO conditions. The proposed GE 7HA.01 CTG has a new and clean designed heat rate of 6,241 Btu/kw-hr on a gross output basis when firing natural gas at ISO conditions without duct firing. Taking into account a parasitic load of 2.5%, the new and clean designed heat rate is 6,401 Btu/kw-hr on a net output basis when firing natural gas at ISO conditions without duct firing. Applying the 12.8% performance degradation and margin factor discussed above, yields a net heat rate of 7,220 Btu/kw-hr when firing natural gas at ISO conditions without duct firing. This net heat rate is lower than any heat rate limit identified in Table G-3 and is proposed as GHG BACT for the Project.

Compliance with the proposed net heat rate limit shall be demonstrated in accordance with ASME Performance Test Code on Overall Plant Performance (ASME PTC 46-1996), or equivalent method approved by the CT DEEP. CPV Towantic proposes to complete this test with the initial performance testing and once every five years thereafter to verify compliance with the proposed net heat rate limit.

The operating data used to determine the GHG BACT emission rate are provided in Appendix A.

Start-up/Shutdown Emissions

Combustion turbines experience increased VOC, CO and NO_x emissions during SU/SD operation. In addition, initial low operating temperatures during start-up preclude the use of the SCR and limit the efficiency of the oxidation catalyst. BACT for start-up and shutdown is good operating practices by following the manufacturer's recommendations during start-up, and limiting the start-up time. The GE 7HA.01 combustion turbines proposed for the project are "fast start" units that can achieve compliance operation within one hour of start-up for all start types.

During SU/SD operation, VOC, CO and NO_x emissions will be minimized during these short transitional periods by proper operational practices in accordance with manufacturer specifications. Furthermore, the proposed GE 7HA.01 combustion turbines are "fast start" units that can achieve compliance operation within one-hour of start-up for all start types, minimizing periods of increased emissions. The vendor specified SU/SD emissions for the combustion turbines are provided in Table G-4. Any increase in emissions during SU/SD operation is included in the potential annual emissions provided in Table E-3; detailed emission calculations are provided in Appendix A.

Table G-4: Start-up/Shutdown Emission Rates (lbs/hr)

Pollutant	Cold Start		Warm Start		Hot Start		Shutdown	
	Gas	ULSD	Gas	ULSD	Gas	ULSD	Gas	ULSD
NO_x	93	104	93	104	70	102	19	34
CO	242	230	242	230	238	231	121	18
VOC	37	87	37	87	36	90	60	23

For the purposes of Table G-4, the following definitions are applied:

- Cold Start-up refers to restarts made at least 72 hours or more after shutdown and shall not last longer than 60 minutes per occurrence.
- Warm Start-up refers to restarts made between 8 and 72 hours after shutdown and shall not last longer than 60 minutes per occurrence.
- Hot Start-up refers to restarts made between 0 and 8 hours after shutdown and shall not last longer than 60 minutes per occurrence.
- Shutdown refers to the period between the time the turbine load drops below 50 percent operating load and the fuel supply to the turbine is cut. Shutdown operation shall not last longer than 60 minutes per occurrence.

Auxiliary Boiler

The Project will include an auxiliary boiler rated at 92.4 MMBtu/hr fired solely with natural gas. The auxiliary boiler will provide steam to warm up the steam turbine to minimize the duration of plant start-ups. Annual operation of the auxiliary boiler will be limited to a full-load equivalent of 4,000 hours per year. Emissions from the boiler are subject to BACT requirements and a review was conducted of recently permitted emission rates from natural gas fired boilers; the results of this review are provided in Table G-5. The emission limits provided in Table G-5 serve as the basis for determining the "most stringent emissions limitation which is achieved in practice" for natural gas-fired auxiliary boilers.

Volatile Organic Compounds

VOC is emitted from the auxiliary boiler as a result of incomplete oxidation of the fuel. VOC emissions can be minimized by the use of proper combustor design and good combustion practices. For the Auxiliary Boiler, the most advanced level of control identified in Table G-5 is good combustion practices achieved through state-of-the-art Ultra LNB. Ultra LNB can minimize VOC emissions and achieve an emission rate of 9.6 ppm corrected to 3% O_2, equivalent to 0.004 lb/MMBtu.

The vendor guaranteed VOC emission rate is at or below all of the permitted VOC limits with the exception of the Green Energy Partners and Cricket Valley Generation projects. Further reductions in VOC emissions might be achieved through installation of an oxidation catalyst. However, VOC emissions from the natural gas fired auxiliary boiler are expected to be straight chain alkanes, which are not efficiently controlled by an oxidation catalyst. Based upon speciated organic compound emission factors provided in AP-42 Section 1.4, Table 1.4-3, non-straight chain alkanes would be expected to contribute 0.00008 lb/MMBtu of the organic compound emissions, which is equal to 2% of the total VOC emissions. Therefore, an oxidation catalyst is not expected to measurably lower the VOC emissions below the vendor guaranteed emission rate.

Table G-5: Summary of Recent PSD BACT Determinations for Natural Gas-Fired Auxiliary Boilers

Facility	Location	Permit Date	Controls	CO[a] (ppm)	VOC[a] (lb/MMBtu)	$PM_{10}/PM_{2.5}$[b] (lb/MMBtu)
Green Energy Partners / Stonewall	Leesburg, VA	04/30/2013	Ultra LNB	50	0.002 (LAER)	0.002
Brunswick County Power	Freeman, VA	05/23/2012	Ultra LNB	50	0.006	0.0075
Dominion Warren County	Front Royal, VA	12/21/2010	Ultra LNB	50	0.0053	0.005
Carroll County Energy	Washington Twp., OH	11/5/2013	Ultra LNB	75	0.006	0.008
Renaissance Power	Carson City, MI	11/1/2013	LNB	50	0.005	0.005
Kleen Energy	Middletown, CT	07/2/2013	LNB	100	0.004	0.006
Oregon Clean Energy	Oregon, OH	06/18/2013	Ultra LNB	75	0.006	0.008
Sunbury Generation	Sunbury, PA	04/01/2013	LNB	100	0.005	0.008
Hess Newark Energy	Newark, NJ	11/01/2012	Ultra LNB	50	0.004	0.005
Cricket Valley Energy Center	Dover, NY	09/27/2012	Ultra LNB	50	0.0015 (LAER)	0.005
Pioneer Valley Generation Company	Westfield, MA	04-12-2012	LNB	50	0.003	0.0048

[a] Concentration in ppm is parts per million by volume, dry, at 3 percent O_2.

[b] Concentration in pounds per million Btu heat input (HHV), except as noted, including front (filterable) and back-half (condensable) PM.

Carbon Monoxide

CO is emitted from the auxiliary boiler as a result of incomplete oxidation of the fuel. CO emissions can be minimized by the use of proper combustor design and good combustion practices. For the auxiliary boiler, the most advanced level of control identified in Table G-5 is good combustion practices achieved through state-of-the-art Ultra LNB. Ultra LNB can minimize CO emissions and achieve an emission rate of 50 ppm corrected to 3% O_2, equivalent to 0.037 lb/MMBtu.

Further reductions in CO emissions could be achieved through installation of an oxidation catalyst. However, the installation of an oxidation catalyst on the auxiliary boiler would not be cost effective due to the already low CO emissions from the boiler. Potential CO emissions from the boiler are only 3.4 lbs/hr and limited to 6.8 tpy due to the proposed operating restriction of 4,000 hrs/yr. The cost to control analysis in Attachment G2 shows a cost to control of over $7,400 per ton of CO removed for an oxidation catalyst on the auxiliary boiler. This cost to control is not economical and an oxidation catalyst was eliminated as a BACT option for this reason.

Based on a review of recently permitted projects, 50 ppm corrected to 3% O_2 was determined to be the most stringent emission limit achieved in practice and is selected as BACT for the auxiliary boiler.

SO_2 and H_2SO_4 Emissions

The most stringent level of control for SO_2 and H_2SO_4 emissions from combustion sources is the firing of pipeline quality natural gas. The USEPA defines pipeline quality natural gas in the Acid Rain regulations under 40 CFR 72.2 as "pipeline natural gas contains 0.5 grains or less of total sulfur per 100 standard cubic feet." Therefore, BACT for SO_2 emissions from the auxiliary boiler is utilizing pipeline quality natural gas as the primary fuel. Therefore, the selection of this fuel results in the greatest level of SO_2 reduction and represents the top level of control.

During combustion, a small percentage of SO_2 is further oxidized to SO_3 that subsequently reacts with moisture in the exhaust to form H_2SO_4. Implementing the top level of control for SO_2 emissions is, therefore also the top level of control for H_2SO_4 emissions.

Particulate Matter

Emissions of particulate matter result from trace quantities of ash (non-combustibles) in the fuel, products of incomplete combustion and conversion of SO_2 in the exhaust to condensable salts. Particulate emissions from a combustion source are minimized by utilizing state-of-the-art combustion technology while firing natural gas since natural gas has the lowest ash and sulfur content available. The permitted PM emission rates in Table G-5 range from 0.002 to 0.008 lb/MMBtu. The reason for the difference in permitted PM emission from the auxiliary boiler is most likely due to differences in vendor specified emission rates.

Based upon recent PSD BACT determinations, 0.007 lb/MMBtu was selected as BACT for the auxiliary boiler based upon the boiler vendor emission guarantee.

Greenhouse Gases

As discussed for the CTGs/DBs, there are three control mechanisms for reducing GHG emissions from combustion processes: (1) low carbon-emitting fuels; (2) energy efficiency; and (3) CCS. The combined-cycle combustion turbines account for 99% of the facility's GHG emissions. As previously discussed, CCS is not technically or economically feasible for the GHG emissions from the combustion turbines. Since CCS becomes more feasible at larger scales, it is concluded that it is not feasible for the auxiliary boiler as it is not feasible for the combined-cycle combustion turbines. BACT for the auxiliary boiler is proposed to be firing natural gas as the sole fuel and efficient boiler design.

Emergency Generator and Fire Pump Engines

The Project will include an emergency diesel generator engine and a diesel fire pump engine. Both engines will be fired with ULSD fuel. Both engines will be used only during emergency situations, with the exception of periodic maintenance/readiness testing, and will be limited to a maximum of 300 operating hours per rolling 12 month period.

No post-combustion controls have been demonstrated in practice for emergency internal combustion engines. In order to satisfy BACT requirements, CPV Towantic proposes that the engines meet NSPS 40 CFR 60 Subpart IIII requirements. Under 40 CFR 60 Subpart IIII, the emergency generator engine must meet the Tier 2 standards and the fire pump engine must meet the emission standards for fire pump engines in Table 4 of 40 CFR 60. Emissions will be controlled through the use of ULSD, engine design, good combustion practices and limited annual operation. In accordance with NSPS Subpart IIII, operation of the engines for maintenance and readiness testing purposes shall be limited to no more than 100 hours per year. The engines will also be operated in accordance with Section 22a-174-3b(e) with total operating hours for all conditions of no more than 300 hours per year.

The Project has received vendor emission guarantees that are below the standards under NSPS Subpart IIII and proposes these emission guarantees as BACT. The emission guarantees are provided in Table G-6.

Table G-6: Emergency Engine Emission Guarantees

Pollutant	Emergency Generator Engine (g/bhp)	Fire Pump Engine (g/kW-hr)
NO_x	4.08	3.80
CO	0.44	0.90
VOC	0.11	0.10
$PM/PM_{10}/PM_{2.5}$	0.03	0.13
SO_2[a]	N/A	N/A

[a] SO_2 emissions will be limited based upon a maximum fuel sulfur content of 15 ppmw (0.0015 lb/MMBtu).

Fugitive GHG Emission Sources

The Project will include natural gas handling systems and circuit breakers that contain sulfur hexafluoride (SF_6). Fugitive losses of natural gas and SF_6 will contribute to GHG emissions from the Project. Provided in Appendix A is an estimate of fugitive GHG emissions totaling 554 tpy, which represents less than 0.1% of the total GHG emissions for the Project. In order to minimize fugitive GHG emissions, the Project will implement current BACT operating standards for these emission sources, including the following:

- Implement an auditory/visual/olfactory leak detection program for the natural gas piping components and make daily observations.
- Equip each circuit breaker with a low pressure alarm and low pressure lockout. SF_6 emissions from each circuit breaker will be calculated annually (calendar year) in accordance with the mass balance approach in Equation DD-1 of 40 CFR Part 98, Subpart DD. The maximum annual leakage rate for SF_6 will not exceed 0.5% of the total SF_6 storage capacity of the plant's circuit breakers.
- Maintain records of all measurements and reports related to the fugitive emission sources including those related to maintenance as well as compliance with the Monitoring and QA/QC procedures defined under 40 CFR 98.304 Subpart DD.

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
N/A	None	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits
Auxiliary Boiler	Several. See Attachment G1.	Good combustion practices	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 6.8

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Oxidation Catalyst	Yes	1.4	5.4	80	Top level of control. Not installed on any known gas fired auxiliary boilers
Good combustion practices	Yes	6.8	0	0	Highest level of control installed in practice

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☐ **Yes** ☒ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	
Oxidation Catalyst	40,872	7,480		Cost to control not economically feasible.
Good combustion practices	0	N/A	N/A	No increase in costs above baseline

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Oxidation Catalyst	No	N/A	Yes	0.007	Increased conversion of SO_2 to SO_3 from 5% to 30% resulting in increased H_2SO_4 emissions.
Good combustion practices	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst	<0.5%	Marginal reduction in boiler efficiency
Good combustion practices	0	No change in energy impacts

Part VI. BACT Recommendation

BACT Option Recommended: Good combustion practices meeting an emission rate of no greater than 50 ppmvd at 3% O2.

Justification: An oxidiation catalyst is not cost effective. The selected controls are the top level of control used in practice for a gas-fired auxiliary boiler rated less than 100 MMBtu/hr.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
1	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
N/A	None	Selective Catalytic Reduction (SCR)	RBLC, CT DEEP BACT Database, permits
Auxiliary Boiler	Several. See Attachment G1.	Ultra-Low-NOx Burners (ULNB)	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 2.0

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Selective Catalytic Reduction (SCR)	Yes	0.45	1.57	78	Top level of control. Not installed on any known gas-fired auxiliary boilers. Reduction from 9 to 2 ppm
Ultra-Low-NOx Burners (ULNB)	Yes	2.02	0	0	Highest level of control installed in practice

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☐ **Yes** ☒ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	
Selective Catalytic Reduction (SCR)	$55,087	$35,062		Cost to control not economically feasible.
Ultra Low-NOx Burners (ULNB)	0	N/A	N/A	No increase in costs above baseline

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Selective Catalytic Reduction (SCR)	No	N/A	Yes	0.26	Ammonia emissions. NH3/ton based upon 5 ppm NH3 slip and NOx reduction from 9 ppm to 2 ppm
Ultra-Low-NOx Burners (ULNB)	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Selective Catalytic Reduction (SCR)	<0.5%	Marginal reduction in boiler efficiency
Ultra-Low-NOx Burners (ULNB)	0	No change in energy impacts

Part VI. BACT Recommendation

BACT Option Recommended: Ultra-Low-NOx Burners meeting an emission rate of no greater than 9 ppmvd at 3% O2.

Justification: An SCR is not cost effective. The selected controls are the top level of control used in practice for a gas-fired auxiliary boiler rated at less than 100 MMBtu/hr.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
8	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
1	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
N/A	None	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits
Auxiliary Boiler	Several. See Attachment G1.	Good combustion practices	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 1.0

BACT Option	**Technically Feasible? (Yes/No)**	**Allowable Emissions Rate**	**Emissions Reduction (tpy)**	**Overall Pollution Reduction Efficiency (%)**	**Comments/Rationale**
Oxidation Catalyst	Yes	0.5	0.5	33	Top level of control. Not installed on any known gas-fired auxiliary boilers. Reduction from allowable emission rate
Good combustion practices	Yes	0.75	0.2	25	Highest level of control installed in practice

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☐ **Yes** ☒ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	
Oxidation Catalyst	$40,872	$163,487	N/A	Cost to control not economically feasible.
Good combustion practices	0	N/A	N/A	No increase in costs above baseline

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	**Toxics Impact**		**Adverse Impact**		**Comments/Rationale**
	Yes/No	**amount/ton**	**Yes/No**	**amount/ton**	
Oxidation Catalyst	No	N/A	Yes	0.19	Increased conversion of SO2 to SO3 from 5% to 30% resulting in increased H2SO4 emissions.
Good combustion practices	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst	<0.5%	Marginal reduction in boiler efficiency
Good combustion practices	0	No change in energy impacts

Part VI. BACT Recommendation

BACT Option Recommended: Good combustion practices meeting an emission rate of no greater than 9.6 ppmvd at 3% O2.

Justification: An oxidation catalyst is not cost effective. The selected controls are the top level of control used in practice for a gas-fired auxiliary boiler rated at less than 100 MMBtu/hr.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
10	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
1	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments:

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM, PM10, and PM2.5 (all PM is expected to be PM2.5)

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Auxiliary Boiler	Several. See Attachment G1.	Pipeline quality natural gas as the sole fuel	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 1.3

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	Yes	1.3	0	0	Top level of control. No reduction expected from natural gas fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as the sole fuel	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as the sole fuel meeting an emission limit of 0.007 lb/MMBtu.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: SO2

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Auxiliary Boiler	Several. See Attachment G1.	Pipeline quality natural gas as the sole fuel	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 0.3

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	Yes	0.3	0	0	Top level of control. No reduction expected from natural gas fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as the sole fuel	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as the sole fuel. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
3	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Auxiliary Boiler	Several. See Attachment G1.	Pipeline quality natural gas as the sole fuel	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 21,627

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	Yes	21,627	0	0	Top level of control. No reduction expected from natural gas-fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	**Toxics Impact**		**Adverse Impact**		**Comments/Rationale**
	Yes/No	**amount/ton**	**Yes/No**	**amount/ton**	
Pipeline quality natural gas as the sole fuel	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as the sole fuel.

Justification: Natural gas is the lowest GHG emitting fossil fuel. The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
5	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: H2SO4

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Auxiliary Boiler	Several. See Attachment G1.	Pipeline quality natural gas as the sole fuel	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 0.02

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	Yes	0.02	0	0	Top level of control. No reduction expected from natural gas-fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as the sole fuel	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as the sole fuel	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as the sole fuel. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
2	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: CO

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 871

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Oxidation Catalyst	Yes	64.5	836	96	Top level of control. Reduction is from steady state operation excluding impact of startup and shutdown emissions.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Oxidation Catalyst	No	N/A	Yes	0.012	Increased conversion of SO2 to SO3 from 5% to 35% resulting in increased H2SO4 emissions. H2SO4/ton reflects ratio of 85.7% of the H2SO4 emissions to CO reduction from baseline in Part II.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst	0	Marginal increase in net heat rate

Part VI. BACT Recommendation

BACT Option Recommended: Oxidation catalyst. CO emissions will be no greater than 0.9 ppmvd at 15% O2 during gas firing without duct firing, 1.7 ppmvd at 15% O2 during gas firing with duct firing, and 2.0 ppmvd at 15% O2 during ULSD firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: NOx

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Low-NOx Combustors	RBLC, CT DEEP BACT Database, permits
Combined-Cycle CT	Several. See Attachment G1.	Selective Catalytic Reduction	RBLC, CT DEEP BACT Database, permits
Combustion Turbine	Several. See Attachment G1.	Water Injection	RBLC, CT DEEP BACT Database, permits
Combustion Turbine	Several. See Attachment G1.	Lean Pre-Mix Combustion	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 3,400

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Selective Catalytic Reduction (SCR)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Lean-Premix Combustion (LPC)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Low-NOx Combustors (LNB)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Water Injection (WI) [oil firing only]	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Low-NOx Combustors (LNB)	No	N/A	No	N/A	
Selective Catalytic Reduction (SCR)	No	N/A	Yes	0.023	Ammonia emissions. NH3/ton reflects ratio of NH3 emissions to NOx reduction from baseline in Part II.
Water Injection (WI)	No	N/A	Yes	N/A	Increased water usage. No impact on air pollutant emissons
Lean-Premix Combustion (LPC)	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Low-NOx Combustors (LNB)	0	No incremental change in energy usage
Selective Catalytic Reduction (SCR)	0	Marginal increase in net heat rate
Water Injection (WI)	0	Marginal increase in parasitic load
Lean-Premix Combustion (LPC)	0	No incremental change in energy usage

Part VI. BACT Recommendation

BACT Option Recommended: Lean pre-mix combustion, low-NOx combustors with SCR during all operating conditions. Water injection during distillate oil firing. NOx emissions will be 2 ppmvd at 15% O2 during natural gas firing and 5.0 ppmvd at 15% O2 during distillate oil firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: VOC

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 22.3

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Oxidation Catalyst	Yes	18.2	4.1	18	Top level of control. Reduction is for steady state operation excluding startup/shutdown emissions. With startup/shutdown emissions, allowable emissions are 24.5

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Oxidation Catalyst	No	N/A	Yes	6.3	Increased conversion of SO2 to SO3 from 5% to 35% resulting in increased H2SO4 emissions. H2SO4/ton reflects ratio of 85.7% of the H2SO4 emissions to VOC reduction from baseline in Part II.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst		Marginal increase in net heat rate

Part VI. BACT Recommendation

BACT Option Recommended: Oxidation catalyst. VOC emissions will be no greater than 1 ppmvd at 15% O2 during natural gas firing without duct firing, 2 ppmvd at 15% O2 during natural gas firing with duct firing, and 2 ppmvd at 15% O2 during distillate oil firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: PM, PM10 and PM2.5 (all PM is expected to be PM2.5)

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachme nt G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 76.7

BACT Option	**Technically Feasible? (Yes/No)**	**Allowable Emissions Rate**	**Emissions Reduction (tpy)**	**Overall Pollution Reduction Efficiency (%)**	**Comments/Rationale**
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	76.7	0	0	Top level of control. No reduction expected from uncontrolled natural gas-fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	**Total Annualized Cost (TAC, $/year)**	**Cost Effectiveness ($/ton)**		**Comments/Rationale**
		Average	**Incremental (optional)**	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. Emissions will not exceed 0.0041 lb/MMBtu for natural gas firing without duct firing at full operating load; 0.0081 lb/MMBtu for natural gas firing with duct firing at full operating load; and 0.020 lb/MMBtu for ULSD firing at full operating load.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: SO_2

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 19.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	19.7	0	0	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas. ULSD fuel, which will be used as backup, will have a maximum sulfur content of 15 ppm by weight. ULSD firing will be limited to no more than 720 hours per rolling 12-month period.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
7	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: GHGs

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
None	None	Carbon Capture & Sequestration	RBLC, CT DEEP BACT Database, EPA GHG BACT guidance

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 2,032,758

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Carbon Capture & Sequestration	Yes	265,602	1,062,407	80	Top level of control. Has never been implemented on a utility scale, privately financed project. Reduction is from proposed allowable emissions.
Advanced Combined-Cycle Combustion Turbine Technology	Yes	1,328,009	704,749	35	Top level of control demonstrated in practice.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☐ **Yes** ☒ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	
Carbon Capture & Sequestration	$151,217,981	142	N/A	TAC based upon annualized cost of $44/MWh from the Interagency Task Force. Costs are not economically feasible.

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Carbon Capture & Sequestration (CCS)	No	N/A	Yes	See Comment	CCS results in an estimated increase in net heat rate resulting in a direct increase of 15% for all pollutants on a lb/MWh basis.
Advanced Combined-Cycle Combustion Turbine Technlogy	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Carbon Capture & Sequestration	15% increase in net heat rate over baseline	Based upon Interagency Task Force
Advanced Combined-Cycle Combustion Turbine Technlogy	0	This is the baseline technology

Part VI. BACT Recommendation

BACT Option Recommended: Advanced Combined-Cycle Combustion Turbine Technlogy. The project will meet an annual gross heat rate of 7,120 Btu/kWh. This heat rate takes into account a 12.8% performance degradation over the life of the unit to account for design margin, wear and tear, and degradation of plant auxiliaries.

Justification: The selected controls are the top level of control demonstrated in practice.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
9	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
1	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: Sulfuric Acid Mist (H2SO4)

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 12.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	12.7	0	0	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact.

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas. ULSD, which will be used as backup, will have a maximum sulfur content of 15 ppm by weight. ULSD firing will be limited to no more than 720 hours per rolling 12-month period.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
4	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1

Unit Description: Combined-Cycle Combustion Turbine #1

Pollutant: NH_3

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	NH_3 Injection Control System	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 77.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
NH3 Injection Control System	Yes	77.7	0	N/A	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
NH_3 Injection Control System	No	N/A	No	N/A	Impacts associated with SCR provided on Attachment G for NOx.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
NH_3 Injection Control System	0	Marginal increase in parasitic load

Part VI. BACT Recommendation

BACT Option Recommended: NH_3 slip emissions will be limited to no greater than 5.0 ppmvd at 15% O_2 during gas firing and 5.0 ppmvd at 15% O_2 during ULSD firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
7	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: CO

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	**Facility**	**Control Technology**	**Reference**
Combined-Cycle CT	Several. See Attachment G1.	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 871

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Oxidation Catalyst	Yes	64.5	836	96	Top level of control. Reduction is from steady state operation excluding impact of startup and shutdown emissions.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Oxidation Catalyst	No	N/A	Yes	0.012	Increased conversion of SO2 to SO3 from 5% to 35% resulting in increased H2SO4 emissions. H2SO4/ton reflects ratio of 85.7% of the H2SO4 emissions to CO reduction from baseline in Part II.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst	0	Marginal increase in net heat rate

Part VI. BACT Recommendation

BACT Option Recommended: Oxidation catalyst. CO emissions will be no greater than 0.9 ppmvd at 15% O2 during gas firing without duct firing, 1.7 ppmvd at 15% O2 during gas firing with duct firing, and 2.0 ppmvd at 15% O2 during ULSD firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: NOx

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1	Low-NOx Combustors	RBLC, CT DEEP BACT Database, permits
Combined-Cycle CT	Several. See Attachment G1.	Selective Catalytic Reduction	RBLC, CT DEEP BACT Database, permits
Combustion Turbine	Several. See Attachment G1.	Water Injection	RBLC, CT DEEP BACT Database, permits
Combustion Turbine	Several. See Attachment G1.	Lean Pre-Mix Combustion	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 3,400

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Selective Catalytic Reduction (SCR)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Lean-Premix Combustion (LPC)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Low-NOx Combustors (LNB)	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.
Water Injection (WI) [oil firing only]	Yes	94.7	3,305	97	Top level of control, LNB, SCR, LPC, and WI will be employed, reduction is for all three technologies combined excluding startup/shutdown emissions.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Low-NOx Combustors (LNB)	No	N/A	No	N/A	
Selective Catalytic Reduction (SCR)	No	N/A	Yes	0.023	Ammonia emissions. NH3/ton reflects ratio of NH3 emissions to NOx reduction from baseline in Part II.
Water Injection (WI)	No	N/A	Yes	N/A	Increased water usage. No impact on air pollutant emissons
Lean-Premix Combustion (LPC)	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Low-NOx Combustors (LNB)	0	No incremental change in energy usage
Selective Catalytic Reduction (SCR)	0	Marginal increase in net heat rate
Water Injection (WI)	0	Marginal increase in parasitic load
Lean-Premix Combustion (LPC)	0	No incremental change in energy usage

Part VI. BACT Recommendation

BACT Option Recommended: Lean pre-mix combustion, low-NOx combustors with SCR during all operating conditions. Water injection during distillate oil firing. NOx emissions will be 2 ppmvd at 15% O2 during natural gas firing and 5.0 ppmvd at 15% O2 during distillate oil firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: VOC

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Oxidation Catalyst	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 22.3

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Oxidation Catalyst	Yes	18.2	4.1	18	Top level of control. Reduction is for steady state operation excluding startup/shutdown emissions. With startup/shutdown emissions, allowable emissions are 24.5

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	**Total Annualized Cost (TAC, $/year)**	**Cost Effectiveness ($/ton)**		**Comments/Rationale**
		Average	**Incremental (optional)**	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Oxidation Catalyst	No	N/A	Yes	6.3	Increased conversion of SO2 to SO3 from 5% to 35% resulting in increased H2SO4 emissions. H2SO4/ton reflects ratio of 85.7% of the H2SO4 emissions to VOC reduction from baseline in Part II.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Oxidation Catalyst		Marginal increase in net heat rate

Part VI. BACT Recommendation

BACT Option Recommended: Oxidation catalyst. VOC emissions will be no greater than 1 ppmvd at 15% O2 during natural gas firing without duct firing, 2 ppmvd at 15% O2 during natural gas firing with duct firing, and 2 ppmvd at 15% O2 during distillate oil firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: PM, PM10 and PM2.5 (all PM is expected to be PM2.5)

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 76.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	76.7	0	0	Top level of control. No reduction expected from uncontrolled natural gas-fired unit

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. Emissions will not exceed 0.0041 lb/MMBtu for natural gas firing without duct firing at full operating load; 0.0081 lb/MMBtu for natural gas firing with duct firing at full operating load; and 0.020 lb/MMBtu for ULSD firing at full operating load.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
11	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: SO2

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 19.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	19.7	0	0	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas. ULSD fuel, which will be used as backup, will have a maximum sulfur content of 15 ppm by weight. ULSD firing will be limited to no more than 720 hours per rolling 12-month period.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
7	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: GHGs

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	**Facility**	**Control Technology**	**Reference**
None	None	Carbon Capture & Sequestration	RBLC, CT DEEP BACT Database, EPA GHG BACT guidance

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 2,032,758

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
Carbon Capture & Sequestration	Yes	265,602	1,062,407	80	Top level of control. Has never been implemented on a utility scale, privately financed project. Reduction is from proposed allowable emissions.
Advanced Combined-Cycle Combustion Turbine Technology	Yes	1,328,009	704,749	35	Top level of control demonstrated in practice.

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☐ **Yes** ☒ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	
Carbon Capture & Sequestration	$151,217,981	142	N/A	TAC based upon annualized cost of $44/MWh from the Interagency Task Force. Costs are not economically feasible.

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Carbon Capture & Sequestration (CCS)	No	N/A	Yes	See Comment	CCS results in an estimated increase in net heat rate resulting in a direct increase of 15% for all pollutants on a lb/MWh basis.
Advanced Combined-Cycle Combustion Turbine Technlogy	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	**Incremental Increase Over Baseline (specify units)**	**Comments/Rationale**
Carbon Capture & Sequestration	15% increase in net heat rate over baseline	Based upon Interagency Task Force
Advanced Combined-Cycle Combustion Turbine Technlogy	0	This is the baseline technology

Part VI. BACT Recommendation

BACT Option Recommended: Advanced Combined-Cycle Combustion Turbine Technlogy. The project will meet an annual gross heat rate of 7,120 Btu/kWh. This heat rate takes into account a 12.8% performance degradation over the life of the unit to account for design margin, wear and tear, and degradation of plant auxiliaries.

Justification: The selected controls are the top level of control demonstrated in practice.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
9	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
1	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: Sulfuric Acid Mist (H2SO4)

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	**Facility**	**Control Technology**	**Reference**
Combined-Cycle CT	Several. See Attachment G1.	Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 12.7

BACT Option	**Technically Feasible? (Yes/No)**	**Allowable Emissions Rate**	**Emissions Reduction (tpy)**	**Overall Pollution Reduction Efficiency (%)**	**Comments/Rationale**
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	Yes	12.7	0	0	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	No	N/A	No	N/A	

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel as backup	0	No energy impact.

Part VI. BACT Recommendation

BACT Option Recommended: Pipeline quality natural gas as primary fuel with limited firing of ultra-low sulfur diesel (ULSD) as backup. The natural gas will have a maximum sulfur content of 0.5 grains per 100 cubic feet of gas. ULSD, which will be used as backup, will have a maximum sulfur content of 15 ppm by weight. ULSD firing will be limited to no more than 720 hours per rolling 12-month period.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
4	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G: Analysis of Best Available Control Technology (BACT)

(Complete this form for each pollutant for which BACT must be incorporated. Duplicate this form as necessary.)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Applicant Name: CPV Towantic, LLC

Unit No.: CT2/DB2

Unit Description: Combined-Cycle Combustion Turbine #2

Pollutant: NH3

Part I. Identify All Control Technologies/ Options

List all available control systems that have practical potential for application to this type of unit.

To ensure a sufficiently broad and comprehensive search of control alternatives, references other than the RBLC data should be investigated and documented. These references include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Source	Facility	Control Technology	Reference
Combined-Cycle CT	Several. See Attachment G1.	NH3 Injection Control System	RBLC, CT DEEP BACT Database, permits

Part II. Rank All Control Options by Technical Feasibility and Control Effectiveness

List all Control Options considered in Part I and identify which options are technically feasible. First list the technically feasible control options in descending order of Overall Pollution Reduction Efficiency and then list the technically infeasible options. If a control option is determined to be technically infeasible, specify the reason in the Comments/Rationale column. DO NOT list the Post-BACT Emissions Rate, Emissions Reduction, and the Overall Pollution Reduction Efficiency (%) for technically infeasible control options. Technically infeasibility should be based on physical, chemical, and engineering principles that would preclude the successful use of the control option on the emissions unit under review. In addition, complete *Attachment G1: Background Search – Existing BACT determinations (DEEP-NSR-APP-214b)* to provide more detailed information regarding each of the technically feasible options listed below. (Duplicate this page as necessary)

Baseline Emissions Rate (tpy): 77.7

BACT Option	Technically Feasible? (Yes/No)	Allowable Emissions Rate	Emissions Reduction (tpy)	Overall Pollution Reduction Efficiency (%)	Comments/Rationale
NH3 Injection Control System	Yes	77.7	0	N/A	Top level of control

Part III. Economic Impacts/Cost Effectiveness

Is the proposed BACT the top control option ☒ **Yes** ☐ **No** **If Yes, go to Part IV**

Complete *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c for each technically feasible BACT options listed in Part II for which economic impacts are to be considered before filling this Part.

Provide the following economic information for each of the BACT options with completed *Attachment G2: Cost/Economic Impact Analysis*, DEEP-NSR-APP-214c.

BACT Option	Total Annualized Cost (TAC, $/year)	Cost Effectiveness ($/ton)		Comments/Rationale
		Average	Incremental (optional)	

Part IV. Environmental Impact Analysis

Provide the following information regarding environmental impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the environmental impact analysis should be done for that option only.

BACT Option	Toxics Impact		Adverse Impact		Comments/Rationale
	Yes/No	amount/ton	Yes/No	amount/ton	
NH3 Injection Control System	No	N/A	No	N/A	Impacts associated with SCR provided on Attachment G for NOx.

Part V. Energy Impact Analysis

Provide the following information regarding energy impacts for each of the technically feasible BACT options listed in Part II. If the BACT option chosen is the top control option, the energy impact analysis should be done for that option only.

Baseline (specify units): N/A

BACT Option	Incremental Increase Over Baseline (specify units)	Comments/Rationale
NH_3 Injection Control System	0	Marginal increase in parasitic load

Part VI. BACT Recommendation

BACT Option Recommended: NH_3 slip emissions will be limited to no greater than 5.0 ppmvd at 15% O_2 during gas firing and 5.0 ppmvd at 15% O_2 during ULSD firing.

Justification: The selected controls are the top level of control.

Part VII. Additional Forms/Attachments

Indicate the number of each type of form included as part of this BACT analysis.

Number of Forms	Form Number	Form Name	Mandatory?
7	DEEP-NSR-APP-214b	Attachment G1: Background Search – Existing BACT Determinations	Yes
0	DEEP-NSR-APP-214c	Attachment G2: Cost/Economic Impact Analysis	Yes, for each economic consideration
1	DEEP-NSR-APP-214d	Attachment G3: Summary of Best Available Control Technology	Yes

Additional Attachments: 0

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	66.7 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	50 ppmvd; 2.5 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.055 lb/MMBtu of heat input; 5.45 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	60 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0375 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Dominion Warren County Power Station / Warren County, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	81391
Capacity (specify units)	88.1 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.037 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit Stationary Source Permit To Construct and Operate, Virginia Electric and Power Company - Warren County Power Station, Registration Number 81391, December 17, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	50 ppmv; 2.78 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boilers

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	66.2 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	50 ppmvd @ 7% O2; 2.45 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Kleen Energy Systems LLV / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0134
Capacity (specify units)	73.5 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5.3 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0134, Premises Number 246, May 22, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.055 lb/MMBtu of heat input; 5.45 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	21 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.037 lbs/MMBtu; 0.74 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Auxiliary Boilers
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	40 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.036 lb/MMBtu (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Sunbury Generation LP / Snyder, PA
Permitting Authority	Pennsylvania Department of Environmental Protection
Permit No.	55-00001E
Capacity (specify units)	106 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.074 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	US EPA RBLC Comprehensive Report, 11/07/2013; for Sunbury Generation LP facility, Snyder PA, Permit ID 55-00001E, 4/1/2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	66.7 MMBtu/hr heat input
BACT/LAER Determination	Low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	9 ppmvd; 0.8 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Low-NOx burners, flue gas re-circulation and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.020 lb/MMBtu of heat input; 1.98 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	60 MMBtu/hr heat input
BACT/LAER Determination	Low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.011 lbs/MMBtu; 9 ppmvd
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra-Low-NOx burners and good combustion practices

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input per unit
BACT/LAER Determination	Ultra-Low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	9 ppmv; 0.83 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boilers

Pollutant: NOx

BACT Option: Ultra Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	66.2 MMBtu/hr heat input
BACT/LAER Determination	Ultra Low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	9 ppmvd; 0.66 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra-Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Kleen Energy Systems LLV / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0134
Capacity (specify units)	73.5 MMBtu/hr heat input per unit
BACT/LAER Determination	Ultra-low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.045 lb/MMBtu; 3.31 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0134, Premises Number 246, May 22, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra-Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Ultra-Low-NOx burners, flue gas re-circulation, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.020 lb/MMBtu of heat input; 1.98 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: NOx

BACT Option: Ultra-Low-NOx burners and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	2 - Auxiliary Boilers
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	40 MMBtu/hr heat input per unit
BACT/LAER Determination	Ultra-Low-NOx burners and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.035 lb/MMBtu (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	66.7 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.4 lb/hr; 0.006 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.006 lb/MMBtu of heat input; 0.59 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☒ **LAER**
Source	Auxiliary Boiler
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	60 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0015 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Dominion Warren County Power Station / Warren County, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	81391
Capacity (specify units)	88.1 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.47 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit Stationary Source Permit To Construct and Operate, Virginia Electric and Power Company - Warren County Power Station, Registration Number 81391, December 17, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	NA
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.002 lb/MMBtu; 0.15 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boilers

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	66.2 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.27 lb/hr; 0.004 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

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To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Kleen Energy Systems LLV / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0134
Capacity (specify units)	73.5 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.28 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0134, Premises Number 246, May 22, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.006 lb/MMBtu of heat input; 0.59 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Auxiliary Boilers
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	40 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.005 lb/MMBtu (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: VOC

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Sunbury Generation LP / Snyder, PA
Permitting Authority	Pennsylvania Department of Environmental Protection
Permit No.	55-00001E
Capacity (specify units)	106 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.005 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	US EPA RBLC Comprehensive Report, 11/07/2013; for Sunbury Generation LP facility, Snyder PA, Permit ID 55-00001E, 4/1/2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	Auxiliary Boiler
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	66.7 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.5 lb/hr; 0.0075 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.008 lb/MMBtu of heat input; 0.79 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	60 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.005 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Dominion Warren County Power Station / Warren County, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	81391
Capacity (specify units)	88.1 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.44 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit Stationary Source Permit To Construct and Operate, Virginia Electric and Power Company - Warren County Power Station, Registration Number 81391, December 17, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	NA
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.002 lb/MMBtu; 0.15 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boilers

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	66.2 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.33 lb/hr; 0.005 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Kleen Energy Systems LLV / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0134
Capacity (specify units)	73.5 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.46 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0134, Premises Number 246, May 22, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.008 lb/MMBtu of heat input; 0.79 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	21 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0048 lbs/MMBtu; 0.10 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Auxiliary Boilers
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	40 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.005 lb/MMBtu (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Sunbury Generation LP / Snyder, PA
Permitting Authority	Pennsylvania Department of Environmental Protection
Permit No.	55-00001E
Capacity (specify units)	106 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Initial performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.008 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	US EPA RBLC Comprehensive Report, 11/07/2013; for Sunbury Generation LP facility, Snyder PA, Permit ID 55-00001E, 4/1/2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0029 lb/MMBtu of heat input; 0.65 tons/yr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: SO_2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Kleen Energy Systems LLV / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0134
Capacity (specify units)	73.5 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.16 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0134, Premises Number 246, May 22, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0014 lb/MMBtu of heat input; 0.14 tons/yr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	66.7 MMBtu/hr heat input
BACT/LAER Determination	High efficiency design and operation and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calcuations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	34,182 tons/year
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG / CO2e

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	26,259.76 tons/yr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input per unit
BACT/LAER Determination	Pipeline-quality natural gas and high efficiency design and operation
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	NA
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	8,873 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG / CO2e

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	11,671 tons/year
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Auxiliary Boilers
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	40 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculation
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	11,503.7 tons per year (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: H2SO4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Auxiliary Boiler
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	99 MMBtu/hr heat input
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.00022 lb/MMBtu of heat input; 0.02 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Unit Description: Auxiliary Boiler

Pollutant: H2SO4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	Auxiliary Boiler
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	99 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.00011 lb/MMBtu of heat input; 0.011 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.5 ppmvd without DB burning; 2.4 ppmvd with DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Catalytic oxidizer and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv with & without DB firing; 12.5 lb/hr with DB firing; 9.9 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd with and without DB burning
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 MMBtu/hr heat input per unit
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmv with & without duct burning; 12.7 lb/hr with HRSG DB firing; 9.9 lb//hr without HRSG DB firing (for each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combine-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd with and without DB; 0.0044 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.9 ppmv & 4.3 lb/hr without DB firing; 1.7 ppmv & 8.4 lb/hr with DB firing, 1.8 ppm firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS monitoring
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidizer and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv and 13.0 lbs/hr with and without DB firing;
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine units with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Use of clean burning fuels, state-of-the-art combustion technology, oxidation catalyst system and establishing minimum load restrictions.
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd (0.0049 lb/MMBtu) with and without DB burning firing gas; 6.0 ppmvd (0.016 lb/MMBtu) firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct burner
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	2,147 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv 3-hr rolling average; 11.4 lbs/hr 24-hr rolling average
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: CO

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combusters with automated control system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	4.1 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmvd with & without DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv with & without DB firing; 20.5 lb/hr with DB firing; 16.3 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☐ BACT ☒ LAER
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd gas firing with and without DB
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 parts per million by volume (ppmv) with & without DB firing; 21 lb/hr each unit with DB firing; 16.2 without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☐ BACT ☒ LAER
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd gas firing with and without DB
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmvd on gas with and without DB firing; 15.5 lb/hr with DB firing; 16.2 lb/hr without DB firing; and 5.9 ppmvd firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS monitoring
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	NA
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv; 21 lbs/hr with DB firing; 22 lbs/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☐ BACT ☒ LAER
Source	Combined-cycle combustion turbine unit with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, water injection during ULSD/Biodiesel firing and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd firing natural gas & 5.0 ppmvd firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	4 - Combined-cycle combustion turbine units with duct burner
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	2,147 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NOx

BACT Option: Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Dry low-NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv with and without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.7 ppmvd without DB burning; 1.6 ppmvd with DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Catalytic oxidizer and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0026 lb/MMBtu and 7.1 lb/hr with DB Firing; 0.0013 lb/MMBtu and 2.8 lb/hr without DB firing;
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.0 ppmvd without DB and 2.0 ppmvd with DB
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 MMBtu/hr heat input per unit
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance yesting
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.4 ppmv with DB firing; 1 ppmv without DB firing 7.3 lb/hr with HRSG DB firing; 16.2 without DB firing (for each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☒ **LAER**
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.0 ppmvd without DB and 2.0 ppmvd with DB
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	Gas Firing: 5.0 ppmv & 10.0 lb/hr with DB firing; 5.0 ppmv & 10.8 lb/hr without DB firing; ULSD Firing: 3.6 ppmvd
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidizer and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.9 ppmv and 5.9 lbs/hr with DB Firing; 1.0 ppmv and 3.9 lbs/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	Combined-cycle combustion turbine unit with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Use of clean burning fuels, state-of-the-art combustion technology, oxidation catalyst system, and establishing minimum load restrictions.
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.0 ppmvd firing natural gas & 6.0 ppmvd firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	4 - Combined-cycle combustion turbine units with duct burner
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	2,147 MMBtu/hr heat input per unit
BACT/LAER Determination	Catalytic oxidation system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance Testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: VOC

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1.4 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Catalytic oxidation system and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Oxidation catalyst system and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0033 lb/MMBtu & 9.7 lb/hr without DB firing; 0.0047 lb/MMBtu & 16.3 lb/hr with DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0078 lb/MMBtu and 19.8 lb/hr with DB Firing; 0.0108 lb/MMBtu and 12.4 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.005 lb/MMBtu without DB and 0.006 lb/MMBtu with DB
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 MMBtu/hr heat input per unit
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance Testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	3.34E-03 lb/MMBtu; 16.2 lb/hr with DB firing; 9.6 lb/hr without DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and pipeline-quality natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0047 lb/MMBtu without DB; 0.0058 lb/MMBtu with DB; and 11 lb/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	11.0 lb/hr with DB firing; 15.2 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: ______________________________

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☐ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	12.55 lbs/hr or 0.0053 lbs/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0055 lb/MMBtu and 14 lbs/hr with DB Firing; 0.0047 lb/MMBtu and 13.3 lbs/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Good combustion practices and pipeline-quality natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine unit with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0040 lb/MMBtu with and without DB burning firing gas; 0.014 lb/MMBtu firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct burner
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	2,147 MMBtu/hr heat input per unit
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance Testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0042 lb/MMBtu; 9 lbs/hr (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: PM10/PM2.5

BACT Option: Zero ash content & low sulfur content fuels and good combustion practices

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Zero ash content & low sulfur content fuels and good combustion practices
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Record keeping
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 gr S/100 scf of gas
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.00112 lb/MMBtu (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0029 lb/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 million Btu per hour heat input
BACT/LAER Determination	Use of low sulfur fuels
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.61E-04 lb/MMBtu; 0.75 lb/hr with DB firing; 0.58 lb/hr without DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	4.9 lb/hr with DB firing; 5.1 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Fuel Selection - natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	Fuel selection - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Fuel sampling of sulfur content
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.060 lb SO2/MMBtu
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering Calculations
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0014 lb/MMBtu of heat input; 36.8 tons/year for both units
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: SO2

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Record keeping
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 gr S/100 scf of gas
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	High efficiency design and operation of the CTGs and HRSG and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	920 lbs/MWh & not to exceed 7,500 Btu/kWh net (HHV) output (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG / CO2e

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations based on monitors
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	859 lb/MW-hr without DB firing & 307,279 lb/hr gross energy output with DB firing; Plant design not to exceed 7,350 Btu/kW-hr HHV (ISO conditions without DB firing)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS & performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	910 lb/MW-hr and 7,650 Btu/kW-hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 million Btu per hour heat input
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and calculation based on power generated to grid
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	903 lb/MWh (gross); operate not to exceed 7,340 Btu HHV/kWh without DB burning & 7,780 Btu HHV/kWh gross output (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	High efficiency design and operation of the CTGs and HRSG and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	887 lbs/MWh & not to exceed 7,522 Btu/kWh net (HHV) output (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG / CO2e

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Engineering calculations based on monitors
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	833 lbs/MW-hr gross energy output & 327,819 lbs/hr; operate not to exceed 7,227 Btu/kW-hr HHV (ISO without DB firing)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Combined-cycle combustion turbine units with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	United States Environmental Protection Agency
Permit No.	Permit Number 052-042-MA15
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Use of clean burning fuels and highly efficient combustion technology,
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	895 lbs/MWh (effective 365 days after initial operation)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	United States Environmental Protection Agency, PSD Permit Number 052-042-MA15

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	4 - Combined-cycle combustion turbine units with duct burner
Facility/Location	Renaissance Power LLC / Carson City, Michigan
Permitting Authority	Michigan Department of Environmental Quality
Permit No.	51-13
Capacity (specify units)	2,147 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1,000 lbs/MW-hr gross output (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Michigan Department of Environmental Quality, Air Quality Division, Permit to Install 51-13, Issued to Renaissance Power LLC, State Registration Number N6873, November 1, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: GHG

BACT Option: Good combustion practices and use of low carbon fuels (natural gas)

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination: ☒ **BACT** ☐ **LAER**

Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	US Environmental Protection Agency
Permit No.	PSD-EPA-R4014
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Good combustion practices and use of low carbon fuels (natural gas)
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	877 lbs/MWh combined cycle with & without DB firing; 1,320 lbs/MWh simple cycle
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	United States Department of Environmental Protection, Region 4, Atlanta, Georgia; Prevention of Significant Deterioration Permit For Greehouse Gas Emissions; Permit PSD-EPA-R4014; Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, December 18, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: H2SO4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with duct-fired HRSG
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	3,442 MMBtu/hr heat input per turbine
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.00058 lb/MMBtu without DB firing: 0.00067 lbMMBtu with DB firing (each unit)
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: H2SO4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct burner / GE 7FA
Facility/Location	Carroll County Energy LLC / Washington Township, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0113762
Capacity (specify units)	2,045 MMBtu/hr heat input per turbine
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0012 lb/MMBtu and 2.52 lb/hr with DB Firing; 0.0016 lb/MMBtu and 4.26 lb/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Caroll County Energy LLC, Facility ID 0210002025, Permit Number P0113762, November 5, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: H_2SO_4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

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To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct burner (Siemens)
Facility/Location	Oregon Clean Energy Center / Oregon, OH
Permitting Authority	Ohio Environmental Protection Agency
Permit No.	P0110840
Capacity (specify units)	2,932 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.0007 lb/MMBtu and 1.5 lbs/hr with DB Firing; 0.0006 lb/MMBtu and 1.6 lbs/hr without DB firing
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Ohio Environmental Protection Agency, Final, Division of Air Pollution Control, Permit-to-Install for Oregon Clean Energy Center, Facility ID 0448020102, Permit Number P0110840, June 18, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: H2SO4

BACT Option: Use of low sulfur fuels - pipeline natural gas

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

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Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Use of low sulfur fuels - pipeline natural gas
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Record keeping
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2 gr S/100 scf of gas
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Monitor to continuously measure and record ammonia feed rate

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	3 - Combined-cycle combustion turbine units with HRSG
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
BACT/LAER Determination	CEM
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEM and Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5.0 ppmvd @ 15% O2
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Monitor to continuously measure and record ammonia feed rate

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units / GE 7FA
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	2,230 million Btu per hour heat input
BACT/LAER Determination	Monitor to continuously measure and record ammonia feed rate
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Observation and documentation daily of the NH3 feed rate monitor
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Flow meter for ammonia injection system

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	2 - Combined-cycle combustion turbine units (GE 207FA.05) with HRSG and duct burner
Facility/Location	Hess Newark Energy Center / Newark, NJ
Permitting Authority	New Jersey Department of Environmental Protection
Permit No.	BOP110001
Capacity (specify units)	2,320 MMBtu/hr heat input per unit
BACT/LAER Determination	Flow meter for ammonia injection system
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Continuous Process Monitoring System & initial performance test
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5 ppmvd @ 15% O2; 16 lbs/hr
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	State of New Jersey Department of Environmental Protection; Division of Air Quality, Bureau of Air Permits; Air Pollution Control Operating Permit PSD Permit and Initial Operating Permit for a PSD Affected Facility; Permit Activity Number: BOP110001 Program Interest Number: 08857; Hess Newark Energy Center, Newark, NJ; 11/1/2012

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Monitor to continuously measure and record ammonia feed rate

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	2 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Kleen Energy Systems LLC / Middletown, CT
Permitting Authority	Connecticut Department of Energy & Environmental Protection
Permit No.	0131 & 0133
Capacity (specify units)	2,136 MMBtu/hr heat input per unit
BACT/LAER Determination	CEMS
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS & performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmv firing gas with & without DB firing; 5.0 ppmv firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Connecticut Department of Energy & Environmental Protection, Bureau of Air Management, New Source Review Permit to Construct and Operate a Stationary Source, Kleen Energy Systems LLC, Middletown, CT, Town-Permit Numbers 104-0131 & 104-0133, Premises Number 246, July, 2, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Flow meter for ammonia injection system

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Combined-cycle combustion turbine with duct burner / Siemens SGT6-5000F
Facility/Location	Idaho Power Company - Langley Gulch Power Plant / New Plymouth, ID
Permitting Authority	Idaho Department of Environmental Quality
Permit No.	P-2009.0092
Capacity (specify units)	2,134 MMBtu/hr heat input
BACT/LAER Determination	Flow meter for ammonia injection system
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	IDEQ, Air Quality Permit to Construct, Idaho Power Company - Langley Gulch Power Plant, Permit Nunber P-2009.0092, Project ID 61199, Facility ID 075-00012, Issued August 14, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Monitor to continuously measure and record ammonia feed rate

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Combined-cycle combustion turbine unit with HRSG
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
BACT/LAER Determination	Monitor to continuously measure and record amonia feed rate
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	2.0 ppmvd (0.003 lb/MMBtu) with and without DB burning firing gas; 2.0 ppmvd (0.0032 lb/MMBtu) firing ULSD
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 and CT2/DB2

Unit Description: Combined-Cycle Combustion Turbines #1 and #2

Pollutant: NH3

BACT Option: Monitor to continuously measure and record ammonia feed rate

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	4 - Combined-cycle combustion turbine units with duct-fire HRSG
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	Florida Department of Environmental Protection
Permit No.	PSD-FL-421
Capacity (specify units)	1,951 MMBtu/hr heat input per unit
BACT/LAER Determination	Monitor to continuously measure and record ammonia feed rate
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	5.0 ppmv
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Florida Department of Environmental Protection, Final Permit, Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, Project No. 1050233-034-AC, Permit No. PSD-FL-421, May 15, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: FUG

Unit Description: Fugitive Natural Gas Emissions

Pollutant: GHG

BACT Option: Enclosed pressure system with pressure gauges and a low pressure detection system

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Electrical Circuit Breakers with SF6
Facility/Location	Virginia Electric and Power Company / Brunswick Co., Freeman, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	52404
Capacity (specify units)	Circuit breakers - CB-1 through CB-11
BACT/LAER Determination	Enclosed circuit breakers and a low pressure detection system with alarm
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Leak detection system with alarm
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1% by weight annual leakage rate
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Virginia Electric and Power Company - Brunswick County Power Station, Registration Number 52404, March 12, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: FUG

Unit Description: Fugitive Natural Gas Emissions

Pollutant: GHG

BACT Option: Enclosed pressure system with pressure gauges and a low pressure detection system

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ BACT ☐ LAER
Source	Electrical Circuit Breakers with SF6
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	Circuit breakers - CB1
BACT/LAER Determination	Enclosed circuit breakers and a low pressure detection system with alarm
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Leak detection system with alarm
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	1% by weight annual leakage rate
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: FUG

Unit Description: Fugitive Natural Gas Emissions

Pollutant: GHG

BACT Option: Enclosed pressure system with pressure gauges and a low pressure detection system with alarm

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Electrical Circuit Breakers with SF6
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	US Environmental Protection Agency
Permit No.	PSD-EPA-R4014
Capacity (specify units)	Circuit breakers - 18 units
BACT/LAER Determination	Enclosed pressure system with pressure gauges with internal set points, and a low pressure detection system with alarm
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	Leak detection system with alarm
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	0.5% by weight annual leakage rate
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	United States Department of Environmental Protection, Region 4, Atlanta, Georgia; Prevention of Significant Deterioration Permit for Greehouse Gas Emissions; Permit PSD-EPA-R4014; Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, December 18, 2013

Attachment G1: Background Search – Existing BACT Determinations

Applicant Name: CPV Towantic, LLC

Unit No.: FUG

Unit Description: Fugitive Natural Gas Component Leaks

Pollutant: GHG

BACT Option: Monthly inspection of piping components and leak repair

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each existing BACT or LAER determination found for a unit which is the same or similar to the subject unit. LAER determinations may be considered BACT in some instances.

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC data should be investigated and documented. These sources include: DEEP BACT Database, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals.

Indicate if BACT or LAER Determination:	☒ **BACT** ☐ **LAER**
Source	Natural Gas Component Leaks
Facility/Location	Tampa Electric Company - Polk Power Station / Mulberry, FL
Permitting Authority	US Environmental Protection Agency
Permit No.	PSD-EPA-R4014
Capacity (specify units)	Piping components delivering natural gas
BACT/LAER Determination	Piping components inspected monthly basis - leaks repaired immediately
Compliance Achieved? (Yes/No)	No
Method of Compliance Determination	CEMS and performance testing
Actions Taken for Noncompliance	NA
Baseline Emissions Rate (specify units)	Not Available
Allowable Emissions Rate (specify units)	Repair of leak dectects immediately
Emissions Reduction Potential (%)	Not Available
Cost Effectiveness ($/ton removed)	Not Available
Reference	United States Department of Environmental Protection, Region 4, Atlanta, Georgia; Prevention of Significant Deterioration Permit for Greehouse Gas Emissions; Permit PSD-EPA-R4014; Tampa Electric Company Polk Power Station, Polk County, Mulberry, FL, December 18, 2013

Attachment G2: Cost/Economic Impact Analysis

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Pollutant: CO

BACT Option: Oxidation Catalyst

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each BACT option in which cost and economic impacts are to be considered. On this form, do not include costs that would be incurred regardless of whether the BACT option is chosen. If the particular item is not applicable to the BACT option being evaluated, indicate “Not Applicable” (N/A) in the appropriate blanks. Add additional lines and/or use additional forms as necessary. Complete this form for each technically feasible BACT Option in Part II of Attachment G *Best Available Control Technology* (DEEP-NSR-APP-214a).

Part I. Total Capital Investment

Total Capital Investment (TCI) is the total direct and indirect capital costs associated with implementation of a BACT option. Use Tables A and B to indicate the direct and indirect capital costs that would be incurred above the baseline project costs. Attach vendor quotes and additional sheets as necessary.

Table A. Direct Capital Costs

	Item	Cost Estimate	Reference/Comments
Purchased Equipment Costs	1. Equipment Costs (Itemize Below)		
	Oxidation Catalyst	$ 100,000	Babcock & Wilcox budgetary quote
		$	
		$	
		$	
	2. Instrumentation	$ 10,000	10%
	3. Sales Tax	$ 5,000	5%
	4. Freight	$ 0	Included with sales tax
	5. Other:	$ 0	
	6. **Purchased Equipment Subtotal** (Sum of Items 1, 2, 3, 4, and 5)	$ 115,000	PEC

Table A. Direct Capital Costs (continued)

		Cost Estimate	Reference/Comments
Direct Installation Costs	7. Foundations and Supports	$ 9,200	8% of PEC
	8. Auxiliaries (duct work, fittings – include only the equipment which would not be necessary if the facility was not controlled)	$ 10,000	
	9. Handling and Erection	$ 16,100	14% of PEC
	10. Piping	$ 2,300	2% of PEC
	11. Insulation and Painting	$ 2,300	2% of PEC
	12. Electrical	$ 4,600	4% of PEC
	13. Site Preparation	$ 0	
	14. Other:	$	
	15. **Direct Installation Costs Subtotal** (Sum of Items 7, 8, 9, 10, 11, 12, 13 and 14)	$ 44,500	
	16. **DIRECT CAPITAL COSTS SUBTOTAL** (Sum of Items 6 and 15)	$ 159,500	

Table B. Indirect Installation Costs

Item	Cost Estimate	Reference/Comments
1. Engineering and Supervision	$ 11,500	10% of PEC
2. Lost Production (for retrofit situations only)	$ N/A	
3. Construction and Field Expenses	$ 5,750	5% of PEC
4. Contractor Fees	$ 11,500	10% of PEC
5. Start-up and Performance Tests	$ 3,450	3% of PEC
6. Over-all Contingencies	$ 3,450	3% of PEC
7. Working Capital (if applicable)	$ N/A	
8. Other:	$	
9. **Indirect Installation Costs Subtotal** (Sum of Items 1, 2, 3, 4, 5, 6, 7, and 8)	$ 35,650	

Table C. Capital Cost Summary

Item	Cost Estimate	Reference/Comments
1. Total Capital Investment Subtotal (Sum of Table A, item 16 and Table B Item 9)	$ 195,150	
2. Capital Recovery Factor	0.1098	Non-Catalyst Components
a. Interest Rate	7.0	Non-Catalyst Components
b. Economic Lifetime	15 years	Non-Catalyst Components
3. Capital Recovery Cost	$ 11,956	Non-Catalyst Components

Part II. Total Annual Cost

Total Annual Cost includes the direct and indirect costs and recovery credits associated with implementation of a BACT option. Use Tables D and E to indicate the annual costs that would be incurred above the baseline project costs. Use Table F to indicate the recovery credits that would be realized after implementation of the BACT option. Summarize the total annual costs in Table G. Attach vendor quotes and additional sheets as necessary.

Table D. Direct Capital Costs

Item	Cost Estimate	Reference/Comments
1. Operating Labor (Itemize Below)		
	$ 0	
	$	
2. Maintenance Labor (Itemize Below)		
	$ 0	
	$	
3. Materials (Itemize Below)		
	$	
	$	
4. Utilities (Itemize Below)		
	$ 0	
	$	
5. Waste Treatment and Disposal (Itemize Below)		
Catalyst disposal	$ 73	
	$	
6. Replacement Parts (Itemize Below)		
Catalyst Replacement	$ 21,306	Catalyst replacement annualized over 3 years
	$	
7. Other (Please Specify)		
	$	
	$	
8. **DIRECT ANNUAL COSTS SUBTOTAL** (Sum of Items 1, 2, 3, 4, 5, 6, and 7)	$ 21,110	

Table E. Indirect Annual Costs

Item	Cost Estimate	Reference/Comments
1. Overhead	$ 0	
2. Property Taxes, Insurance, and Administrative Charges	$ 7,806	4% of Total Capital Investment
3. Other:	$	
4. **Indirect Annual Costs Subtotal** (Sum of Items 1, 2, and 3)	$ 7,806	

Table F. Recovery Credits

Item	Cost Estimate	Reference/Comments
1. Materials Recovered		
	$	
2. Energy Recovered		
	$	
3. Other (Please Specify)		
	$	
4. **RECOVERY CREDITS SUBTOTAL** (Sum of Items 1, 2, and 3)	$	

Table G. Total Annual Cost Summary

Item	Cost Estimate	Reference/Comments
1. Direct Annual Costs Subtotal (Table D, Item 8)	$ 21,110	
2. Indirect Annual Costs Subtotal (Table E, Item 4)	$ 7,806	
3. Recovery Credits Subtotal (Table F, Item 4)	$ 0	
4. **TOTAL ANNUAL COST SUBTOTAL** (Items 1 plus Item 2 minus Item 3)	$ 28,916	

Part III. Cost/Economic Impact Summary

Table H. Total Annualized Cost Summary

Item	Cost Estimate
1. Capital Recovery Cost (Table C, Item 3)	$ 11,956
2. Total Annual Cost Subtotal (Table G, Item 4)	$ 28,916
3. **TOTAL ANNUALIZED COST (TAC)** (Sum of Items 1 and 2)	$ 40,872

Table I. Cost Effectiveness

Item	Cost Estimate
1. Baseline Emissions Rate (tpy)	6.83
2. Allowable Emissions Rate (tpy)	1.37
3. Total Pollutant Removed (tpy) (Difference of Item 1 and Item 2)	5.46
4. **AVERAGE COST EFFECTIVENESS OF BACT OPTION** ($/ton of pollutant removed) (Divide Table H, Item 3 by Table I, Item 3)	$ 7,480

Part IV. Attachments

List any attachments used to support your calculations in the table below.

Attachment	Description
Appendix A	**Supporting calculations**

CPV Towantic, LLC
Economic Analysis For Oxidation Catalyst - CO Control Auxiliary Boiler

Assumptions: Emissions reduction based on potential emissions of 6.83 tpy per

Heat Input (MMBtu/hr)	92.4	total operating hours	4,000	
Catalyst volume (ft^3)	20	*Estimated*		
CO Emissions After Control (tpy)	1.37	*Reduction from 50 ppm to 10 ppm*		
Equipment Cost (EC)				
Oxidation catalyst			$100,000	*Vendor quote*
Instrumentation (10% Of Equipment Costs)			$10,000	*OAQPS*
Taxes and Freight (5% Of Equipment Costs)			$5,000	*OAQPS*
Total Equipment Cost (TEC)			**$115,000**	
Direct Installation Costs				
Foundation		(TEC*0.08)	$9,200	*OAQPS*
Erection and Handling		(TEC*0.14)	$16,100	*OAQPS*
Electrical		(TEC*0.04)	$4,600	*OAQPS*
Piping		(TEC*0.02)	$2,300	*OAQPS*
Insulation		(TEC*0.01)	$1,150	*OAQPS*
Painting		(TEC*0.01)	$1,150	*OAQPS*
Inlet/Outlet Transitions and Vanes		Estimate	$10,000	
Total Direct Installation Cost			**$44,500**	
Indirect Installation Costs				
Engineering and Supervision		(TEC*0.1)	$11,500	*OAQPS*
Construction/Field Expenses		(TEC*0.05)	$5,750	*OAQPS*
Construction Fee		(TEC*0.1)	$11,500	*OAQPS*
Start up		(TEC*0.02)	$2,300	*OAQPS*
Performance Test		(TEC*0.01)	$1,150	*OAQPS*
Contingencies		(TEC*0.03)	$3,450	*OAQPS*
Total Indirect Installation Cost			**$35,650**	
A. Total Capital Cost (TCC)			**$195,150**	
B. Direct annual costs, $/yr				
Operating labor			$0	*Assumed zero*
Supervisory labor (*15% of Operating Labor*)			$0	*Assumed zero*
Maintenance labor & Materials			$0	*Assumed zero*
Catalyst replacement (5 yrs @ 7% interest)			$21,036	*Catalyst = 75% of TEC*
Catalyst Disposal (*Catalyst Volume x ($15/cf) x(0.2439)*)			$73	*OAQPS*
Electricity			$0	*Assumed zero*
Performance Loss			$0	*Assumed zero*
Production loss (*negligible*)			$0	*Assumed zero*
		Total direct annual cost	**$21,110**	
C. Indirect annual costs, $/yr				
Overhead (60% of Operating, Supervisory, & Maintenance Labor)			$0	*OAQPS*
Property taxes, insurance and administration (*0.04 x TCC*)			$7,806	*OAQPS*
Capital Recovery[(1)] *[0.1098 x [total capital invest. - (catalyst replacement /0.2439)]*			$11,956	*15 years at 7% interest*
		Total indirect annual cost	**$19,762**	
		Total annual cost	$40,872	
		CO (tons controlled/yr)	5.46	
		Cost/ton CO controlled	**$7,480**	

[(1)] *The capital recovery factor for the non-catalyst components is 0.1098 based on a 15-year equipment life and 7 percent interest rate. The annualized catalyst replacement costs is based upon a 3 year life at 7% interest resulting in a capital recovery factor of 0.3811.*

Sources: OAQPS Control Cost Manual (USEPA 1990a)

Attachment G2: Cost/Economic Impact Analysis

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Pollutant: NOx

BACT Option: Selective Catalytic Reduction

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each BACT option in which cost and economic impacts are to be considered. On this form, do not include costs that would be incurred regardless of whether the BACT option is chosen. If the particular item is not applicable to the BACT option being evaluated, indicate "Not Applicable" (N/A) in the appropriate blanks. Add additional lines and/or use additional forms as necessary. Complete this form for each technically feasible BACT Option in Part II of Attachment G *Best Available Control Technology* (DEEP-NSR-APP-214a).

Part I. Total Capital Investment

Total Capital Investment (TCI) is the total direct and indirect capital costs associated with implementation of a BACT option. Use Tables A and B to indicate the direct and indirect capital costs that would be incurred above the baseline project costs. Attach vendor quotes and additional sheets as necessary.

Table A. Direct Capital Costs

	Item		Cost Estimate	Reference/Comments
Purchased Equipment Costs	1. Equipment Costs (Itemize Below)			
	Selective Catalytic Reduction		$ 150,000	Babcock & Wilcox budgetary quote
			$	
			$	
			$	
	2. Instrumentation		$ 15,000	10%
	3. Sales Tax		$ 7,500	5%
	4. Freight		$ 0	Included with sales tax
	5. Other:		$ 0	
	6. **Purchased Equipment Subtotal** (Sum of Items 1, 2, 3, 4, and 5)		$ 172,500	PEC

Table A. Direct Capital Costs (continued)

Direct Installation Costs	7. Foundations and Supports	$ 13,800	8% of PEC
	8. Auxiliaries (duct work, fittings – include only the equipment which would not be necessary if the facility was not controlled)	$ 10,000	
	9. Handling and Erection	$ 24,150	14% of PEC
	10. Piping	$ 3,450	2% of PEC
	11. Insulation and Painting	$ 3,450	2% of PEC
	12. Electrical	$ 6,900	4% of PEC
	13. Site Preparation	$ 0	
	14. Other:	$	
	15. **Direct Installation Costs Subtotal** (Sum of Items 7, 8, 9, 10, 11, 12, 13 and 14)	$ 61,750	
	16. **DIRECT CAPITAL COSTS SUBTOTAL** (Sum of Items 6 and 15)	$ 234,250	

Table B. Indirect Installation Costs

Item	Cost Estimate	Reference/Comments
1. Engineering and Supervision	$ 17,250	10% of PEC
2. Lost Production (for retrofit situations only)	$ N/A	
3. Construction and Field Expenses	$ 8,625	5% of PEC
4. Contractor Fees	$ 17,250	10% of PEC
5. Start-up and Performance Tests	$ 5,175	3% of PEC
6. Over-all Contingencies	$ 5,175	3% of PEC
7. Working Capital (if applicable)	$ N/A	
8. Other:	$	
9. **Indirect Installation Costs Subtotal** (Sum of Items 1, 2, 3, 4, 5, 6, 7, and 8)	$ 53,475	

Table C. Capital Cost Summary

Item	Cost Estimate	Reference/Comments
1. Total Capital Investment Subtotal (Sum of Table A, item 16 and Table B Item 9)	$ 287,725	
2. Capital Recovery Factor	0.1098	Non-Catalyst Components
a. Interest Rate	7.0	Non-Catalyst Components
b. Economic Lifetime	15 years	Non-Catalyst Components
3. Capital Recovery Cost	$ 22,120	Non-Catalyst Components

Part II. Total Annual Cost

Total Annual Cost includes the direct and indirect costs and recovery credits associated with implementation of a BACT option. Use Tables D and E to indicate the annual costs that would be incurred above the baseline project costs. Use Table F to indicate the recovery credits that would be realized after implementation of the BACT option. Summarize the total annual costs in Table G. Attach vendor quotes and additional sheets as necessary.

Table D. Direct Capital Costs

Item	Cost Estimate	Reference/Comments
1. Operating Labor (Itemize Below)		
	$ 0	
	$	
2. Maintenance Labor (Itemize Below)		
	$ 0	
	$	
3. Materials (Itemize Below)		
Ammonia	$ 348	Reagent
	$	
4. Utilities (Itemize Below)		
	$ 0	
	$	
5. Waste Treatment and Disposal (Itemize Below)		
Catalyst disposal	$ 73	
	$	
6. Replacement Parts (Itemize Below)		
Catalyst Replacement	$ 21,036	Catalyst replacement annualized over 3 years
	$	
7. Other (Please Specify)		
	$	
	$	
8. **DIRECT ANNUAL COSTS SUBTOTAL** (Sum of Items 1, 2, 3, 4, 5, 6, and 7)	$ 21,458	

Table E. Indirect Annual Costs

Item		Cost Estimate	Reference/Comments
1. Overhead		$ 0	
2. Property Taxes, Insurance, and Administrative Charges		$ 11,509	4% of Total Capital Investment
3. Other:		$	
4. **Indirect Annual Costs Subtotal** (Sum of Items 1, 2, and 3)		$ 11,509	

Table F. Recovery Credits

Item	Cost Estimate	Reference/Comments
1. Materials Recovered		
	$	
2. Energy Recovered		
	$	
3. Other (Please Specify)		
	$	
4. **RECOVERY CREDITS SUBTOTAL** (Sum of Items 1, 2, and 3)	$	

Table G. Total Annual Cost Summary

Item	Cost Estimate	Reference/Comments
1. Direct Annual Costs Subtotal (Table D, Item 8)	$ 21,458	
2. Indirect Annual Costs Subtotal (Table E, Item 4)	$ 11,509	
3. Recovery Credits Subtotal (Table F, Item 4)	$ 0	
4. **TOTAL ANNUAL COST SUBTOTAL** (Items 1 plus Item 2 minus Item 3)	$ 32,967	

Part III. Cost/Economic Impact Summary

Table H. Total Annualized Cost Summary

Item	Cost Estimate
1. Capital Recovery Cost (Table C, Item 3)	$ 22,120
2. Total Annual Cost Subtotal (Table G, Item 4)	$ 32,967
3. **TOTAL ANNUALIZED COST (TAC)** (Sum of Items 1 and 2)	$ 55,087

Table I. Cost Effectiveness

Item	Cost Estimate
1. Baseline Emissions Rate (tpy)	2.02
2. Allowable Emissions Rate (tpy)	0.45
3. Total Pollutant Removed (tpy) (Difference of Item 1 and Item 2)	1.57
4. **AVERAGE COST EFFECTIVENESS OF BACT OPTION** ($/ton of pollutant removed) (Divide Table H, Item 3 by Table I, Item 3)	$ 35,062

Part IV. Attachments

List any attachments used to support your calculations in the table below.

Attachment	Description
Appendix A	**Supporting calculations**

CPV Towantic, LLC
Economic Analysis For SCR - Auxiliary Boiler

Assumptions: *Emissions reduction based on potential emissions of 2.02 tpy per*

Heat Input (MMBtu/hr)	92.4	total operating hours	4,000	
Catalyst volume (ft^3)	20	*Estimated*		
NOx Emissions After Control (tpy)	0.449	*Reduction from 9 ppm to 2 ppm*		
Equipment Cost (EC)				
SCR			$150,000	*Vendor quote*
Instrumentation (10% Of Equipment Costs)			$15,000	*OAQPS*
Taxes and Freight (5% Of Equipment Costs)			$7,500	*OAQPS*
Total Equipment Cost (TEC)			**$172,500**	
Direct Installation Costs				
Foundation		(TEC*0.08)	$13,800	*OAQPS*
Erection and Handling		(TEC*0.14)	$24,150	*OAQPS*
Electrical		(TEC*0.04)	$6,900	*OAQPS*
Piping		(TEC*0.02)	$3,450	*OAQPS*
Insulation		(TEC*0.01)	$1,725	*OAQPS*
Painting		(TEC*0.01)	$1,725	*OAQPS*
Inlet/Outlet Transitions and Vanes		Estimate	$10,000	
Total Direct Installation Cost			**$61,750**	
Indirect Installation Costs				
Engineering and Supervision		(TEC*0.1)	$17,250	*OAQPS*
Construction/Field Expenses		(TEC*0.05)	$8,625	*OAQPS*
Construction Fee		(TEC*0.1)	$17,250	*OAQPS*
Start up		(TEC*0.02)	$3,450	*OAQPS*
Performance Test		(TEC*0.01)	$1,725	*OAQPS*
Contingencies		(TEC*0.03)	$5,175	*OAQPS*
Total Indirect Installation Cost			**$53,475**	
A. Total Capital Cost (TCC)			**$287,725**	
B. Direct annual costs, $/yr				
Operating labor			$0	*Assumed zero*
Supervisory labor (*15% of Operating Labor*)			$0	*Assumed zero*
Maintenance labor & Materials			$0	*Assumed zero*
Catalyst replacement (5 yrs @ 7% interest)			$21,036	*Catalyst = 50% of TEC*
Catalyst Disposal (*Catalyst Volume x ($15/cu) x(0.2439)*)			$73	*ACT*
Ammonia (*$600/ton anhydrous NH3, 0.37 tons NH3 per ton NOx removed*)			$348	*Market Price*
Electricity			$0	*Assumed zero*
Performance Loss			$0	*Assumed zero*
Production loss (*negligible*)			$0	*Assumed zero*
		Total direct annual cost	**$21,458**	
C. Indirect annual costs, $/yr				
Overhead (60% of Operating, Supervisory, & Maintenance Labor)			$0	*Assumed zero*
Property taxes, insurance and administration (*0.04 x TCC*)			$11,509	*ACT*
Capital Recovery[1] *[0.1098 x [total capital invest. - (catalyst replacement /0.2439)]*			$22,120	*15 years at 7% interest*
		Total indirect annual cost	**$33,629**	
		Total annual cost	$55,087	
		NOx (tons controlled/yr)	1.57	
		Cost/ton NOx controlled	**$35,062**	

(1) *The capital recovery factor for the non-catalyst SCR components is 0.1098 based on a 15-year equipment life and 7 percent interest rate. The annualized catalyst replacement costs is based upon a 3 year life at 7% interest resulting in a capital recovery factor of 0.3811.*

Sources: USEPA, 1993a: "Alternative Control Techniques Document--NOx Emission from Stationary Gas Turbines." EPA-453/R-93-007, U.S. Environmental Protection Agency, Research Triangle Park, NC.
OAQPS Control Cost Manual (USEPA 1990a)

Attachment G2: Cost/Economic Impact Analysis

Applicant Name: CPV Towantic, LLC

Unit No.: AB

Pollutant: VOC

BACT Option: Oxidation Catalyst

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each BACT option in which cost and economic impacts are to be considered. On this form, do not include costs that would be incurred regardless of whether the BACT option is chosen. If the particular item is not applicable to the BACT option being evaluated, indicate "Not Applicable" (N/A) in the appropriate blanks. Add additional lines and/or use additional forms as necessary. Complete this form for each technically feasible BACT Option in Part II of Attachment G *Best Available Control Technology* (DEEP-NSR-APP-214a).

Part I. Total Capital Investment

Total Capital Investment (TCI) is the total direct and indirect capital costs associated with implementation of a BACT option. Use Tables A and B to indicate the direct and indirect capital costs that would be incurred above the baseline project costs. Attach vendor quotes and additional sheets as necessary.

Table A. Direct Capital Costs

	Item		Cost Estimate	Reference/Comments
Purchased Equipment Costs	1. Equipment Costs (Itemize Below)			
	Oxidation Catalyst		$ 100,000	Babcock & Wilcox budgetary quote
			$	
			$	
			$	
	2. Instrumentation		$ 10,000	10%
	3. Sales Tax		$ 5,000	5%
	4. Freight		$ 0	Included with sales tax
	5. Other:		$ 0	
	6. **Purchased Equipment Subtotal** (Sum of Items 1, 2, 3, 4, and 5)		$ 115,000	PEC

Table A. Direct Capital Costs (continued)

Direct Installation Costs	7. Foundations and Supports	$ 9,200	8% of PEC
	8. Auxiliaries (duct work, fittings – include only the equipment which would not be necessary if the facility was not controlled)	$ 10,000	
	9. Handling and Erection	$ 16,100	14% of PEC
	10. Piping	$ 2,300	2% of PEC
	11. Insulation and Painting	$ 2,300	2% of PEC
	12. Electrical	$ 4,600	4% of PEC
	13. Site Preparation	$ 0	
	14. Other:	$	
	15. **Direct Installation Costs Subtotal** (Sum of Items 7, 8, 9, 10, 11, 12, 13 and 14)	$ 44,500	
	16. **DIRECT CAPITAL COSTS SUBTOTAL** (Sum of Items 6 and 15)	$ 159,500	

Table B. Indirect Installation Costs

Item	Cost Estimate	Reference/Comments
1. Engineering and Supervision	$ 11,500	10% of PEC
2. Lost Production (for retrofit situations only)	$ N/A	
3. Construction and Field Expenses	$ 5,750	5% of PEC
4. Contractor Fees	$ 11,500	10% of PEC
5. Start-up and Performance Tests	$ 3,450	3% of PEC
6. Over-all Contingencies	$ 3,450	3% of PEC
7. Working Capital (if applicable)	$ N/A	
8. Other:	$	
9. **Indirect Installation Costs Subtotal** (Sum of Items 1, 2, 3, 4, 5, 6, 7, and 8)	$ 35,650	

Table C. Capital Cost Summary

Item	Cost Estimate	Reference/Comments
1. Total Capital Investment Subtotal (Sum of Table A, item 16 and Table B Item 9)	$ 195,150	
2. Capital Recovery Factor	0.1098	Non-Catalyst Components
a. Interest Rate	7.0	Non-Catalyst Components
b. Economic Lifetime	15 years	Non-Catalyst Components
3. Capital Recovery Cost	$ 11,956	Non-Catalyst Components

Part II. Total Annual Cost

Total Annual Cost includes the direct and indirect costs and recovery credits associated with implementation of a BACT option. Use Tables D and E to indicate the annual costs that would be incurred above the baseline project costs. Use Table F to indicate the recovery credits that would be realized after implementation of the BACT option. Summarize the total annual costs in Table G. Attach vendor quotes and additional sheets as necessary.

Table D. Direct Capital Costs

Item	Cost Estimate	Reference/Comments
1. Operating Labor (Itemize Below)		
	$ 0	
	$	
2. Maintenance Labor (Itemize Below)		
	$ 0	
	$	
3. Materials (Itemize Below)		
	$	
	$	
4. Utilities (Itemize Below)		
	$ 0	
	$	
5. Waste Treatment and Disposal (Itemize Below)		
Catalyst disposal	$ 73	
	$	
6. Replacement Parts (Itemize Below)		
Catalyst Replacement	$ 21,306	Catalyst replacement annualized over 3 years
	$	
7. Other (Please Specify)		
	$	
	$	
8. **DIRECT ANNUAL COSTS SUBTOTAL** (Sum of Items 1, 2, 3, 4, 5, 6, and 7)	$ 21,110	

Table E. Indirect Annual Costs

Item		Cost Estimate	Reference/Comments
1. Overhead		$ 0	
2. Property Taxes, Insurance, and Administrative Charges		$ 7,806	4% of Total Capital Investment
3. Other:		$	
4. **Indirect Annual Costs Subtotal** (Sum of Items 1, 2, and 3)		$ 7,806	

Table F. Recovery Credits

Item	Cost Estimate	Reference/Comments
1. Materials Recovered		
	$	
2. Energy Recovered		
	$	
3. Other (Please Specify)		
	$	
4. **RECOVERY CREDITS SUBTOTAL** (Sum of Items 1, 2, and 3)	$	

Table G. Total Annual Cost Summary

Item	Cost Estimate	Reference/Comments
1. Direct Annual Costs Subtotal (Table D, Item 8)	$ 21,110	
2. Indirect Annual Costs Subtotal (Table E, Item 4)	$ 7,806	
3. Recovery Credits Subtotal (Table F, Item 4)	$ 0	
4. **TOTAL ANNUAL COST SUBTOTAL** (Items 1 plus Item 2 minus Item 3)	$ 28,916	

Part III. Cost/Economic Impact Summary

Table H. Total Annualized Cost Summary

Item	Cost Estimate
1. Capital Recovery Cost (Table C, Item 3)	$ 11,956
2. Total Annual Cost Subtotal (Table G, Item 4)	$ 28,916
3. **TOTAL ANNUALIZED COST (TAC)** (Sum of Items 1 and 2)	$ 40,872

Table I. Cost Effectiveness

Item	Cost Estimate
1. Baseline Emissions Rate (tpy)	0.75
2. Allowable Emissions Rate (tpy)	0.50
3. Total Pollutant Removed (tpy) (Difference of Item 1 and Item 2)	0.25
4. **AVERAGE COST EFFECTIVENESS OF BACT OPTION** ($/ton of pollutant removed) (Divide Table H, Item 3 by Table I, Item 3)	$ 163,487

Part IV. Attachments

List any attachments used to support your calculations in the table below.

Attachment	Description
Appendix A	**Supporting calculations**

CPV Towantic, LLC
Economic Analysis For Oxidation Catalyst - VOC Control Auxiliary Boiler

Assumptions: Emissions reduction based on potential emissions of 6.83 tpy per

Heat Input (MMBtu/hr)	92.4	total operating hours	4,000
Catalyst volume (ft^3)	20	*Estimated*	
CO Emissions After Control (tpy)	0.50	*Reduction from 50 ppm to 10 ppm*	

Equipment Cost (EC)			
Oxidation catalyst		$100,000	*Vendor quote*
Instrumentation (10% Of Equipment Costs)		$10,000	*OAQPS*
Taxes and Freight (5% Of Equipment Costs)		$5,000	*OAQPS*
Total Equipment Cost (TEC)		**$115,000**	
Direct Installation Costs			
Foundation	(TEC*0.08)	$9,200	*OAQPS*
Erection and Handling	(TEC*0.14)	$16,100	*OAQPS*
Electrical	(TEC*0.04)	$4,600	*OAQPS*
Piping	(TEC*0.02)	$2,300	*OAQPS*
Insulation	(TEC*0.01)	$1,150	*OAQPS*
Painting	(TEC*0.01)	$1,150	*OAQPS*
Inlet/Outlet Transitions and Vanes	Estimate	$10,000	
Total Direct Installation Cost		**$44,500**	
Indirect Installation Costs			
Engineering and Supervision	(TEC*0.1)	$11,500	*OAQPS*
Construction/Field Expenses	(TEC*0.05)	$5,750	*OAQPS*
Construction Fee	(TEC*0.1)	$11,500	*OAQPS*
Start up	(TEC*0.02)	$2,300	*OAQPS*
Performance Test	(TEC*0.01)	$1,150	*OAQPS*
Contingencies	(TEC*0.03)	$3,450	*OAQPS*
Total Indirect Installation Cost		**$35,650**	
A. Total Capital Cost (TCC)		**$195,150**	
B. Direct annual costs, $/yr			
Operating labor		$0	*Assumed zero*
Supervisory labor (*15% of Operating Labor*)		$0	*Assumed zero*
Maintenance labor & Materials		$0	*Assumed zero*
Catalyst replacement (5 yrs @ 7% interest)		$21,036	*Catalyst = 75% of TEC*
Catalyst Disposal (*Catalyst Volume x ($15/cf) x(0.2439)*)		$73	*OAQPS*
Electricity		$0	*Assumed zero*
Performance Loss		$0	*Assumed zero*
Production loss (*negligible*)		$0	*Assumed zero*
	Total direct annual cost	**$21,110**	
C. Indirect annual costs, $/yr			
Overhead (60% of Operating, Supervisory, & Maintenance Labor)		$0	*OAQPS*
Property taxes, insurance and administration (*0.04 x TCC*)		$7,806	*OAQPS*
Capital Recovery[1] *[0.1098 x [total capital invest. - (catalyst replacement /0.2439)]*		$11,956	*15 years at 7% interest*
	Total indirect annual cost	**$19,762**	
	Total annual cost	$40,872	
	CO (tons controlled/yr)	0.25	
	Cost/ton CO controlled	**$163,487**	

[1] *The capital recovery factor for the non-catalyst components is 0.1098 based on a 15-year equipment life and 7 percent interest rate. The annualized catalyst replacement costs is based upon a 3 year life at 7% interest resulting in a capital recovery factor of 0.3811.*

Sources: OAQPS Control Cost Manual (USEPA 1990a)

Attachment G2: Cost/Economic Impact Analysis

Applicant Name: CPV Towantic, LLC

Unit No.: CT1/DB1 & CT2/DB2 Combined

Pollutant: GHGs

BACT Option: Carbon Capture and Sequestration

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete this form for each BACT option in which cost and economic impacts are to be considered. On this form, do not include costs that would be incurred regardless of whether the BACT option is chosen. If the particular item is not applicable to the BACT option being evaluated, indicate "Not Applicable" (N/A) in the appropriate blanks. Add additional lines and/or use additional forms as necessary. Complete this form for each technically feasible BACT Option in Part II of Attachment G *Best Available Control Technology* (DEEP-NSR-APP-214a).

Part I. Total Capital Investment

Total Capital Investment (TCI) is the total direct and indirect capital costs associated with implementation of a BACT option. Use Tables A and B to indicate the direct and indirect capital costs that would be incurred above the baseline project costs. Attach vendor quotes and additional sheets as necessary.

Table A. Direct Capital Costs

	Item		Cost Estimate	Reference/Comments
Purchased Equipment Costs	1. Equipment Costs (Itemize Below)			
	Carbon Capture System		$ 497,636,364	Report of the Interagency Task Force on Carbon Capture and Storage estimate of $340 million for 550 MW plant scaled up to 805 MW.
	Transport Pipeline		$ 112,123,162	NETL "Carbon Dioxide Transport and Storage Costs in NETL Studies" estimate for 100 mile, 16" ID pipeline. See Appendix A
			$	
			$	
	2. Instrumentation		$	
	3. Sales Tax		$	
	4. Freight		$	
	5. Other:		$	
	6. **Purchased Equipment Subtotal** (Sum of Items 1, 2, 3, 4, and 5)		$	

Table A. Direct Capital Costs (continued)

Direct Installation Costs	7. Foundations and Supports	$	
	8. Auxiliaries (duct work, fittings – include only the equipment which would not be necessary if the facility was not controlled)	$	
	9. Handling and Erection	$	
	10. Piping	$	
	11. Insulation and Painting	$	
	12. Electrical	$	
	13. Site Preparation	$	
	14. Other:	$	
	15. **Direct Installation Costs Subtotal** (Sum of Items 7, 8, 9, 10, 11, 12, 13 and 14)	$	
	16. **DIRECT CAPITAL COSTS SUBTOTAL** (Sum of Items 6 and 15)	$	

Table B. Indirect Installation Costs

Item	Cost Estimate	Reference/Comments
1. Engineering and Supervision	$	
2. Lost Production (for retrofit situations only)	$	
3. Construction and Field Expenses	$	
4. Contractor Fees	$	
5. Start-up and Performance Tests	$	
6. Over-all Contingencies	$	
7. Working Capital (if applicable)	$	
8. Other:	$	
9. **Indirect Installation Costs Subtotal** (Sum of Items 1, 2, 3, 4, 5, 6, 7, and 8)	$	

Table C. Capital Cost Summary

Item	Cost Estimate	Reference/Comments
1. Total Capital Investment Subtotal (Sum of Table A, item 16 and Table B Item 9)	$ 609,759,526	Total capital investment for carbon capture equipment and pipeline
2. Capital Recovery Factor		
a. Interest Rate		
b. Economic Lifetime		
3. Capital Recovery Cost	$	

Part II. Total Annual Cost

Total Annual Cost includes the direct and indirect costs and recovery credits associated with implementation of a BACT option. Use Tables D and E to indicate the annual costs that would be incurred above the baseline project costs. Use Table F to indicate the recovery credits that would be realized after implementation of the BACT option. Summarize the total annual costs in Table G. Attach vendor quotes and additional sheets as necessary.

Table D. Direct Capital Costs

Item	Cost Estimate	Reference/Comments
1. Operating Labor (Itemize Below)		
	$	
	$	
2. Maintenance Labor (Itemize Below)		
	$	
	$	
3. Materials (Itemize Below)		
	$	
	$	
4. Utilities (Itemize Below)		
	$	
	$	
5. Waste Treatment and Disposal (Itemize Below)		
	$	
	$	
6. Replacement Parts (Itemize Below)		
	$	
	$	
7. Other (Please Specify)		
	$	
	$	
8. **DIRECT ANNUAL COSTS SUBTOTAL** (Sum of Items 1, 2, 3, 4, 5, 6, and 7)	$	

Table E. Indirect Annual Costs

Item		Cost Estimate	Reference/Comments
1. Overhead		$	
2. Property Taxes, Insurance, and Administrative Charges		$	
3. Other:		$	
4. **Indirect Annual Costs Subtotal** (Sum of Items 1, 2, and 3)		$	

Table F. Recovery Credits

Item	Cost Estimate	Reference/Comments
1. Materials Recovered		
	$	
2. Energy Recovered		
	$	
3. Other (Please Specify)		
	$	
4. **RECOVERY CREDITS SUBTOTAL** (Sum of Items 1, 2, and 3)	$	

Table G. Total Annual Cost Summary

Item	Cost Estimate	Reference/Comments
1. Direct Annual Costs Subtotal (Table D, Item 8)	$	
2. Indirect Annual Costs Subtotal (Table E, Item 4)	$	
3. Recovery Credits Subtotal (Table F, Item 4)	$	
4. **TOTAL ANNUAL COST SUBTOTAL** (Items 1 plus Item 2 minus Item 3)	$ 302,435,980	Based upon Interagency Task Force report estimate of $44/MWh (Figure III-I) and 6,873,545 MWh/yr

Part III. Cost/Economic Impact Summary

Table H. Total Annualized Cost Summary

Item	Cost Estimate
1. Capital Recovery Cost (Table C, Item 3)	$
2. Total Annual Cost Subtotal (Table G, Item 4)	$
3. **TOTAL ANNUALIZED COST (TAC)** (Sum of Items 1 and 2)	$ 302,435,980

Table I. Cost Effectiveness

Item	Cost Estimate
1. Baseline Emissions Rate (tpy)	2,656,018
2. Allowable Emissions Rate (tpy)	531,203
3. Total Pollutant Removed (tpy) (Difference of Item 1 and Item 2)	2,124,814
4. **AVERAGE COST EFFECTIVENESS OF BACT OPTION** ($/ton of pollutant removed) (Divide Table H, Item 3 by Table I, Item 3)	$ 142

Part IV. Attachments

List any attachments used to support your calculations in the table below.

Attachment	Description
Appendix A	**Transport pipeline cost calculation**

Pipeline Costs for Carbon Transport
CPV Towantic, LLC

Diameter	16	inches
Miles	100	miles
Materials	\$24,703,945	$\$70,350 + \$2.01 \times L \times (330.5 \times D^2 + 686.7 \times D + 26,960)$
Labor	\$58,874,146	$\$371,850 + \$2.01 \times L \times (343.2 \times D^2 + 2,074 \times D + 170,013)$
Misc	\$22,142,680	$\$147,250 + \$1.55 \times L \times (8,417 \times D + 7,234)$
Right of Way	\$5,045,760	$\$51,200 + \$1.28 \times L \times (577 \times D + 29,788)$
Surge Tank	\$1,244,724	Fixed cost = \$1,244,724
Control System	\$111,907	Fixed cost = \$111,907
TOTAL	\$112,123,162	

Source: National Energy Technology Lab report "Carbon Dioxide Transport and Storage Costs in NETL Studies" (March 2013)

Attachment G3: Summary of Best Available Control Technology Reviews

Complete this form in accordance with the instructions (DEEP-NSR-INST-214) to ensure the proper handling of your application. Print or type unless otherwise noted.

List each emissions unit subject to the BACT requirements. For each emissions unit listed, indicate the Emissions Unit number and all pollutants that are subject to the BACT requirements. *Attachment G: Analysis of Best Available Control Technology* (DEEP-NSR-APP-214a) should be completed for each emissions unit-pollutant combination listed in this table.

		Pollutants Subject to BACT									
Unit Description	**Unit Number**	**PM**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**NO_X**	**CO**	**VOC**	**GHG**	**Other** (please specify)	
Combustion Turbine #1	CT1	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Combustion Turbine #2	CT2	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Duct Burner #1	DB1	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Duct Burner #2	DB2	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Auxliary Boiler	AB	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Emergency Generator Engine	EG	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Emergency Fire Pump Engine	FP	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Fugitive Emissions	FUG	☐	☐	☐	☐	☐	☐	☐	☒	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
Baseline Project Emissions Total in tons per year (tpy):		154.7	154.7	154.7	39.7	6,800	1,742	58.1	4,065,516	180.6	**Comments:** 180.6 tpy reflects combined H2SO4 and NH3 emissions
Allowable Project Emissions Total in tons per year (tpy):		154.7	154.7	154.7	39.7	196.2	136.4	49.9	2,678,612	180.6	

ATTACHMENT H – MAJOR MODIFICATION DETERMINATION FORM

Not required.

ATTACHMENT I – PREVENTION OF SIGNIFICANT DETERIORATION

The following pages provide a complete PSD of Air Quality form (DEEP-NSR-APP-216) and additional information to support the form in accordance with DEEP's instructions. Attachments associated with this form are listed below, indicating applicability and location, if not provided following this form.

- Attachment 216-A: Existing Actual Emissions: Alternative Two-Year Period Justification (Not Applicable)
- Attachment 216-B: New Actual Emissions: Alternative Two-Year Period Justification (Not Applicable)
- Attachment 216-C: BACT Determination (see Attachments G, G1, G2, and G3)
- Attachment 216-D: Ambient Monitoring Analysis (see Attachment L)
- Attachment 216-E: Source Impact Analysis (see Attachment L)
- Attachment 216-F: Ambient Air Quality Analysis (see Attachment L)
- Attachment 216-G: Visibility, Soils, Vegetation, and Growth Analysis (see Attachment L)
- Attachment 216-H: Growth and Ambient Air Impact Analysis (see Attachment L)
- Attachment 216-I: Project Description and Operating Schedule (see Forms 200, E202, and E212)
- Attachment 216-J: Construction Schedule

Attachment I: Prevention of Significant Deterioration of Air Quality (PSD) Program Form

DEEP USE ONLY
App. No.: ____________________

Applicant Name: CPV Towantic, LLC

Complete this form in accordance with the instructions (DEEP-NSR-INST-216) to ensure the proper handling of your application. Print or type unless otherwise noted.

Complete a separate form for each unit that is part of this application package.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Note: This form is not required if Current Premises Potential Emissions and Proposed Allowable Emissions (from Part VII.B of *Attachment F: Premises Information Form - DEEP-NSR-APP-217)* from this project are each less than major source thresholds for each pollutant. (i.e. an existing minor premises adds a minor source which results in the premises becoming a new major source.)

Part I: Applicability

A. Project with Proposed Allowable Emissions Greater than Major Stationary Source Thresholds Located at an Existing Minor Stationary Source (Premises)

Indicate the pollutants for which the project will be classified as a major stationary source as indicated in Part VII.B of Attachment F. (Check all that apply.)	☒ **PM** ☒ **PM_{10}** ☒ **$PM_{2.5}$** ☐ **SO_2** ☒ **NO_x**	☐ **VOC** ☒ **CO** ☐ **Pb** ☒ **CO_2e and GHG**

The project is subject to PSD review for each pollutant that is checked above. Complete Part II of this form for all other pollutants.

B. Any Project Located at an Existing Major Stationary Source (Premises)

If the project is located at an existing major stationary source (prior to the subject equipment being permitted), complete *Attachment H: Major Modification Determination Form* (DEEP-NSR-APP-213) before completing this form.

Indicate the pollutants for which the project will be considered a major modification as indicated in Part V of Attachment H. (Check all that apply.)	☐ **PM** ☐ **PM_{10}** ☐ **$PM_{2.5}$** ☐ **SO_2** ☐ **NO_x**	☐ **VOC** ☐ **CO** ☐ **Pb** ☐ **CO_2e and GHG**

The project is subject to PSD review for each pollutant that is checked above. Complete Part II of this form for all other pollutants.

Part II: Additional Pollutant PSD Applicability

In addition to the pollutants previously indicated, PSD review must be completed for every other pollutant that has a total project emissions increase and a net emissions increase that are greater than the significant emission rate thresholds in Table 3a(k)-1 of RCSA section 22a-174-3a(k) even if the premises is not major for that pollutant.

Indicate in the following table the pollutants that the source emits (that were not checked in Part I of this form) and enter the total proposed project emissions increase.

A. Total Project Emissions Increase

Pollutant	Project Emits Pollutant?	Total Project Proposed Potential Emissions (tpy)	Total Project 2-yr Actual Emissions, if modification (tpy)	Total Project Emissions Increase (tpy)	Significant Emission Rate Threshold (tpy)	Is TOTAL PROJECT EMISSIONS INCREASE greater than the SIGNIFICANT EMISSION RATE THRESHOLD?
PM	☐				25	☐ Yes ☐ No
PM_{10}	☐				15	☐ Yes ☐ No
$PM_{2.5}$	☐				10	☐ Yes ☐ No
SO_2 (as a $PM_{2.5}$ precursor)	☒	39.7	0	39.7	40	☐ Yes ☒ No
SO_2 (NAAQS)	☒	39.7	0	39.7	40	☐ Yes ☒ No
NO_x (as an ozone precursor)	☐				25	☐ Yes ☐ No
NO_x (as a $PM_{2.5}$ precursor)	☐				40	☐ Yes ☐ No
NO_x (NAAQS)	☐				40	☐ Yes ☐ No
CO	☐				100	☐ Yes ☐ No
VOC	☒	49.9	0	49.9	25	☒ Yes ☐ No
Pb	☒	0.03	0	0.03	0.6	☐ Yes ☒ No
H_2S	☐				10	☐ Yes ☐ No
Reduced Sulfur & Compounds	☐				10	☐ Yes ☐ No

A. Total Project Emissions Increase, continued

Pollutant	Project Emits Pollutant?	Total Project Proposed Potential Emissions (tpy)	Total Project 2-yr Actual Emissions, if modification (tpy)	Total Project Emissions Increase (tpy)	Significant Emission Rate Threshold (tpy)	Is TOTAL PROJECT EMISSIONS INCREASE greater than the SIGNIFICANT EMISSION RATE THRESHOLD?
Sulfuric Acid Mist	☒	**25.3**	**0**	**25.3**	**7**	☒ Yes ☐ No
Fluorides	☐				**3**	☐ Yes ☐ No
Mercury	☒	**0.007**	**0**	**0.007**	**0.1**	☐ Yes ☒ No
MWC Organics	☐				**3.5E-6**	☐ Yes ☐ No
MWC Metals	☐				**15**	☐ Yes ☐ No
MWC Acid Gases	☐				**40**	☐ Yes ☐ No
CO_2e	☐				**75,000**	☐ Yes ☐ No

The Total Project 2- yr Actual Emissions must be based on actual emissions for the two years immediately preceding the proposed modification. New units would enter a "0" since they did not previously exist. If the most recent two year period was not selected as the representative two year period for actual emissions above, check here and submit written justification for using a period other than the most recent two years of actual emission as Attachment 216-A.	☐ Attachment 216-A

If "No":
This pollutant ***is not*** subject to PSD Review and the PSD Review determination is complete.

If "Yes" and the project is located at an existing minor stationary source (i.e. completed Part I.A of this form):
This pollutant ***is*** subject to PSD Review. Continue to Part III.

If "Yes" and the project is located at an existing major stationary source (i.e. completed Part I.B of this form):
Continue on to Parts II.B and C for the subject pollutant.

B. Contemporaneous Creditable Emissions Increases and Decreases

Provide the following information for all contemporaneous creditable emissions increases and decreases during the 5-year contemporaneous period determined in Part II of *Attachment H: Major Modification Determination Form*. Calculate the *Total Contemporaneous Increases/Decreases* for the subject pollutant and enter the results in Part I.C. Duplicate this page if necessary.

Change Type (NEW, MOD, REM, PBR, DB)	Equipment Description	License or Regulation No. (P)	Date of Change	Pollutants (tpy)									
				New ACT	2-yr ACT	New ACT	2-yr ACT	New ACT	2-yr ACT	New ACT	2-yr ACT	New ACT	2-yr ACT
			/ /										
			/ /										
			/ /										
			/ /										
			/ /										
			/ /										
			/ /										
			/ /										
Totals (tpy)													
TOTAL CONTEMPORANEOUS INCREASES/DECREASES (tpy) (New ACT – 2-yr ACT)													

The 2-yr ACT emissions for each unit listed in Part II.B must be based on the average actual emissions for the two years immediately preceding the change. New units would enter a "0" since they did not previously exist. If the most recent two year period was not selected as the representative two year period for actual emissions for any changed unit, check here and submit written justification for using a period other than two years of actual emissions immediately preceding the change as Attachment 216-B.	☐ Attachment 216-B

C. Emissions Summation

Add the *Total Project Emission Increase* values from Part II.A of this form to the *Total Contemporaneous Increases/Decreases* value from Part II.B of this form to calculate the *Net Emissions Increase* for the subject pollutant.

Pollutant	Total Project Emissions Increase (tpy)	Total Contemporaneous Increases/Decreases	Net Emissions Increase	Significant Emission Rate Threshold (RCSA §22a-174-3a(k), Table 3a(k)-1)	Is NET EMISSIONS INCREASE equal to or greater than SIGNIFICANT EMISSION RATE THRESHOLD?
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No

If "No":

This pollutant ***is not*** subject to PSD Review and the PSD Review determination is complete.

If "Yes":

This pollutant ***is*** subject to PSD Review. Continue to Part III.

Part III: Attachments

Complete this part for each pollutant subject to PSD review as indicated in Parts I and II of this form.

Please check the attachments being submitted as verification that all applicable attachments have been submitted with this application form. When submitting such documents, please label the documents as indicated in this Part (e.g., Attachment 216-A, etc.) and be sure to include the applicant's name. All Attachments are **REQUIRED**.

Best Available Control Technology (BACT) Determination Submit a BACT analysis for each pollutant subject to PSD review. The owner or operator of any source subject to PSD shall install BACT as approved by the commissioner. Please complete *Attachment G: BACT Determination Form* (DEEP-NSR-APP-214) and attach it as Attachment 216-A. Include a detailed description as to what system of continuous emission reduction is planned for the subject source or modification, emission estimates, or any other information necessary to demonstrate that BACT will be applied. [RCSA sections 22a-174-3a(k)(4); -3a(k)(8)(A)(v)]	☒ **Attachment 216-C**
Air Quality Analysis	
Ambient Monitoring Analysis Submit an analysis of the effect on ambient air quality in the area of the subject source or modification for pollutants that have allowable emissions in excess of the amount listed in Table 3a(k)-1 of RCSA section 22a-174-3a(k)-1 *or* those listed in RCSA section 22a-174-24. The analysis shall meet the requirements of RCSA section 22a-174-3a(k)(5). [RCSA section 22a-174-3a(k)(5)]	☒ **Attachment 216-D**
Source Impact Analysis Submit a source impact analysis of the effects on ambient air quality in the area of the subject source or modification for pollutants that will have an impact on air quality equal or greater than any amount listed in Table 3a(i)-1 of RCSA section 22a-174-3a(i) or any applicable maximum allowable increase above baseline concentration established in Table 3a(k)-2 of RCSA section 22a-174-3a(k). The analysis shall meet the requirements of RCSA section 22a-174-3a(k)(6). [RCSA section 22a-174-3a(k)(6)]	☒ **Attachment 216-E**
Ambient Air Quality Analysis Submit an ambient air quality analysis in accordance with RCSA section 22a-174-3a(i), of the effect of the pollutants listed in Table 3a(k)-1 of RCSA section 22a-174-3a(k). [RCSA section 22a-174-3a(k)(7)]	☒ **Attachment 216-F**
Additional Source Information	
Visibility, Soils, Vegetation and Growth Analysis Submit an analysis of the impairment to visibility, soils, and vegetation that would result from construction and operation of the subject source or modification, and an analysis of the general commercial, residential, industrial and other associated growth. The applicant does not need to provide an analysis of the impact on vegetation having no significant commercial or residential value. [RCSA section 22a-174-3a(k)(8)(A)(i)]	☒ **Attachment 216-G**

Part III: Attachments (continued)

Growth and Ambient Air Impact Analysis Submit an analysis of the ambient air quality impact projected for the area as a result of the general commercial, residential, industrial, and other growth associated with the subject source or modification. [RCSA section 22a-174-3a(k)(8)(A)(ii)]	☒ **Attachment 216-H**
Project Description and Operating Schedule Submit a description of the nature, location, design capacity and typical operating schedule of the subject source or modification, including specifications and drawings showing its design and plant layout. [RCSA section 22a-174-3a(k)(8)(A)(iii)]	☒ **Attachment 216-I**
Construction Schedule Submit a schedule for construction of the subject source or modification. [RCSA section 22a-174-3a(k)(8)(A)(iv)]	☒ **Attachment 216-J**

Attachment 216-J Construction Schedule

Estimated Towantic Construction Schedule

	Activity	Start	Finish
1	NTP Date	12/01/15	12/04/15
2	Engineering design	12/01/15	03/31/17
3	Owner Provide Full Site Access	12/01/15	12/04/15
4	Construction Mobilization	03/01/16	03/04/16
5	Civil Tasks	03/01/16	06/01/17
6	Mechanical Tasks	12/01/16	05/01/18
7	Electrical Tasks	06/01/17	05/01/18
8	Erect Heat Recovery Steam Generator #1	01/01/17	01/01/18
9	Erect Heat Recovery Steam Generator #2	02/01/17	02/01/18
10	Erect Gas Turbine #1	03/01/17	09/01/17
11	Erect Gas Turbine #2	04/01/17	10/03/17
12	Erect Steam Turbine	06/01/17	01/31/18
13	Start-Up / Comissioning	10/01/17	06/06/18
14	Guaranteed Substantial Completion	06/01/18	06/06/18

ATTACHMENT J – NON-ATTAINMENT NEW SOURCE REVIEW

The following pages provide a complete Non-Attainment Review of Air Quality form (DEEP-NSR-APP-215) and additional information to support the form in accordance with DEEP's instructions. Attachments associated with this form are listed below, indicating applicability and location, if not provided following this form.

- Attachment 215-A: Alternative Two-Year Period Justification (Not Applicable)
- Attachment 215-B: Analysis of Alternatives
- Attachment 215-C: Secondary or Cumulative Impact Analysis (see Attachment L)
- Attachment 215-D: Off-setting Emission Reductions or Emission Reduction Credits Determination
- Attachment 215-E: Required Number of CERCs Determination (See Attachment J: Part II)

Attachment J: Non-Attainment Review Form

Applicant Name: CPV Towantic, LLC

DEEP USE ONLY
App. No.: ____________

Complete this form in accordance with the instructions (DEEP-NSR-INST-215) to ensure the proper handling this application. Print or type unless otherwise noted.

Questions? Visit the Air Permitting web page or contact the Air Permitting Engineer of the Day at 860-424-4152.

Note: This form is not required if Current Premises Potential Emissions and Proposed Allowable Emissions (from Part VII.B of *Attachment F: Premises Information Form - DEEP-NSR-APP-217)* from this project are each less than major source thresholds for each pollutant. (i.e. an existing minor premises adds a minor source which results in the premises becoming a new major source.)

If the proposed project will be a major modification for NOx or VOC, after completing *Attachment H: Major Modification Determination Form* (DEEP-NSR-APP-215), skip Part I of this form and complete Parts II and III of this form.

Part I: Applicability

A. If the proposed project is a new major stationary source:

Indicate the air quality status of the area in which the premises is or will be located and list the allowable emissions from the proposed project for each pollutant. Indicate if such emissions are greater than the major source thresholds listed. (Check all that apply. See instructions for the air quality attainment status of Connecticut municipalities).

Ozone (check one):

☐	***Severe Non-Attainment***	
	NOx Allowable Emissions from Proposed Project:	tpy
	Are NOx Allowable Emissions from the Proposed Project Greater Than 25 tpy?	☐ Yes ☐ No
	VOC Allowable Emissions from Proposed Project:	tpy
	Are VOC Allowable Emissions from the Proposed Project Greater Than 25 tpy?	☐ Yes ☐ No
☒	***Serious Non-Attainment***	
	NOx Allowable Emissions from Proposed Project:	194.7 tpy
	Are NOx Allowable Emissions from the Proposed Project Greater Than 50 tpy?	☒ Yes ☐ No
	VOC Allowable Emissions from Proposed Project	49.9 tpy
	Are VOC Allowable Emissions from the Proposed Project Greater Than 50 tpy?	☐ Yes ☒ No

If "No":

This pollutant ***is not*** subject to Non-Attainment Review and the Non-Attainment Review determination is complete.

If "Yes":

This pollutant ***is*** subject to Non-Attainment Review. Continue to Parts II and III of this form for the subject pollutant.

B. If the proposed project is being located at an existing major stationary source and the project did not trigger a major modification for NOx or VOC:

Calculate the net emissions increase of NOx and VOC during the 5-year contemporaneous period determined in Part II of *Attachment H: Major Modification Determination Form,* including the current project. ("Deminimis Rule")

If the net emissions increase during the 5-year contemporaneous period was calculated on *Attachment H – Major Modification Determination Form*, please enter the values in Part I.B.2 of this form. You do not need to complete Part I.B.1 of this form. Otherwise, complete Part I.B.1 of this form to determine the contemporaneous increases and decreases during the 5-year contemporaneous period and enter the results in Part I.B.2.

1. Contemporaneous Creditable Emissions Increases and Decreases

Provide the following information for all contemporaneous creditable NOx and VOC emissions increases and decreases during the 5-year contemporaneous period. Calculate the *Total Contemporaneous Increases/Decreases* for the subject pollutant and enter the results in Part I.B.2. Duplicate this page if necessary.

Change Type (NEW, MOD, REM, PBR, DB)	Equipment Description	License or Regulation No. (P)	Date of Change	Pollutants (tpy)			
				NOx		VOC	
				New ACT	2-yr ACT	New ACT	2-yr ACT
			/ /				
			/ /				
			/ /				
			/ /				
			/ /				
			/ /				
			/ /				
			/ /				
Totals (tpy)							
TOTAL CONTEMPORANEOUS INCREASES/DECREASES (tpy) (New ACT – 2-yr ACT)							

The 2-yr ACT emissions for each changed unit must be based on the average actual emissions for the two years immediately preceding the chnage. New units would enter a "0" since they did not previously exist. If the most recent two year period was not selected as the representative two year period for actual emissions for any changed unit above, check here and submit written justification for using a period other than two years of actual emissions immediately preceding the change as Attachment 215-A.	☐ Attachment 215-A

2. Emission Summation

Add the *Total Project Emission Increase* from Part III of *Attachment H: Major Modification Determination Form* to the *Total Contemporaneous Increases/Decreases* from Part I.B.1 of this form to calculate the *Net Emissions Increase* for the subject pollutant.

Pollutant	Total Project Emissions Increase (tpy)	Total Contemporaneous Increases/Decreases	Net Emissions Increase	Is NET EMISSIONS INCREASE equal to or greater than 25 tpy?
NOx				☐ Yes ☐ No
VOC				☐ Yes ☐ No

If "No":

This pollutant ***is not*** subject to Non-Attainment Review and the Non-Attainment Review determination is complete.

If "Yes":

This pollutant ***is*** subject to Non-Attainment Review. Continue to Parts II and III of this form for the subject pollutant.

Part II: Application Requirements for Non-Attainment Areas

Check the applicable box below for each attachment being submitted with this application form. When submitting any supporting documents, please label the documents as indicated in this Part (e.g., Attachment 215A, etc.) and be sure to include the applicant's name as indicated on this application form. All Attachments are **REQUIRED**.

Analysis of Alternatives Submit an Analysis of Alternatives for each non-attainment pollutant that includes: • Alternative sites for the proposed activity; • Alternative sizes for the subject source or modification; • Alternative production processes; • A demonstration of whether the benefits of the subject source or modification would significantly outweigh its adverse environmental impacts, including secondary impacts and cumulative impacts, and social costs imposed as a result of the location, construction or modification.	☒ **Attachment 215-B**
Secondary or Cumulative Impact Analysis Submit an evaluation of secondary impacts or cumulative impacts for each non-attainment pollutant with potential emissions in excess of the amount listed in Table 3a(k)-1 of RCSA section 22a-174-3a(k).	☒ **Attachment 215-C**
Offsetting Emission Reductions or Emission Reduction Credits Determination Submit documentation for each non-attainment pollutant demonstrating that the planned use of any internal offsets comply with the requirements of RCSA section 22a-174-3a(*l*)(4)(B) and that certified emission reduction credits comply with the requirements of RCSA section 22a-174-3a(*l*)(5).	☒ **Attachment 215-D**
Required Number of CERCs Determination Submit the calculation method for the number of required CERCs for approval for each non-attainment pollutant.	☒ **Attachment 215-E** Number of CERCs Required: NOx: 233.6 VOC: $PM_{2.5}$:

Part III: Lowest Achievable Emission Rate (LAER) Review

Note: Complete this part for each non-attainment pollutant.

Pollutant: ☒ NOx ☐ VOC ☐ $PM_{2.5}$

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC database should be investigated and documented. These sources include: Any limitation found in a State Implementation Plan, EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals. Attach documentation of investigation to this form. The source of information, (e.g., RBLC, South Coast AQMD, state permit, vendor, etc.) and sufficient information for verification of the achievable limit,(e.g. contact information to include: name, affiliation, address, phone, email of contact; any relevant permit; RBLC ID; etc.) should be included for each system.

A. Achievability

List all LAER found for a unit which is the same or similar to the subject unit and determine if the emissions limitation has been demonstrated in practice.

LAER	Achievable?	If No, Explain (be specific)
NOx - 2.0 ppmvd at 15% O2 during natural gas firing of combustion turbines & duct burners	☒ Yes ☐ No	
NOx - 5.0 ppmvd at 15% O2 during ULSD firing of combustion turbines	☒ Yes ☐ No	
NOx - 9.0 ppmvd at 3% O2 using ultra-low NOx burners for the auxiliary boiler	☒ Yes ☐ No	
NOx - meet NSPS Subpart IIII for emergency engines	☒ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	
	☐ Yes ☐ No	

B. LAER Information

Complete this table for each LAER listed in Part III.A of this form.

LAER Option: NOx - 9.0 ppmvd at 3% O2 using ultra-low NOx burners for the auxliary boiler

Unit Description	Auxiliary boiler
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority with Contact Information	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	75 MMBtu/hr heat input
LAER Determination	Ultra Low-NOx burners and good combustion practices
Compliance Achieved?	☐ Yes ☒ No
Method of Compliance Determination	Initial performance testing
Post-LAER Emissions Rate (specify units)	N/A
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

C. Proposed LAER Determination

LAER Option Proposed:	**NOx - 9.0 ppmvd at 3% O2 during natural gas firing of auxiliary boiler**

Justification:	**Lowest permitted NOx emission rate for a natural gas fired auxiliary boiler. See Att. G discussion for further detail.**

B. LAER Information

Complete this table for each LAER listed in Part III.A of this form.

LAER Option: NOx - 2.0 ppmvd at 15% O2 during natural gas firing of combustion turbines & duct burners

Unit Description	Combined Cycle Combustion Turbine
Facility/Location	Cricket Valley Energy Center LLC / Dover Plains, NY
Permitting Authority with Contact Information	New York State Department of Environmental Conservation
Permit No.	3-1326-00275/00004
Capacity (specify units)	2,061 MMBtu/hr heat input
LAER Determination	Dry low NOx combustors, Selective Catalytic Reduction, and good combustion practices
Compliance Achieved?	☐ Yes ☒ No
Method of Compliance Determination	CEMS and performance testing
Post-LAER Emissions Rate (specify units)	N/A
Reference	New York State Department of Environmental Conservation; Preconstruction Permit for a Major Stationary Source; Cricket Valley Energy Center, Dover Plains, NY; Air State Facility Permit ID 3-1326-00275/00004; September 27, 2012.

C. Proposed LAER Determination

LAER Option Proposed:	**NOx - 2.0 ppmvd at 15% O2 during natural gas firing of combustion turbines & duct burners.**

Justification:	**Lowest permitted NOx emission rate for a combined cycle combustion turbine firing natural gas. See Att. G discussion for further detail.**

B. LAER Information

Complete this table for each LAER listed in Part III.A of this form.

LAER Option: NOx - 5.0 ppmvd at 15% O2 during ULSD firing of combustion turbines

Unit Description	Combined Cycle Combustion Turbine
Facility/Location	Westfield Land Development Company, LLC - Pioneer Valley Energy Center / Westfield, MA
Permitting Authority with Contact Information	Massachusetts Department of Environmental Protection
Permit No.	Plan #: 1-B-08-037; Trans. #: X223780
Capacity (specify units)	2,542 MMBtu/hr heat input
LAER Determination	Dry low NOx combustors, Selective Catalytic Reduction, Water injection during ULSD firing and good combustion practices
Compliance Achieved?	☐ Yes ☒ No
Method of Compliance Determination	CEMS and performance testing
Post-LAER Emissions Rate (specify units)	N/A
Reference	Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection Western Regional Office; Conditional Approval to Construct, Westfield Land Development Company, LLC - Pioneer Valley Energy Center, Plan #: 1-B-08-037; Trans. #: X223780; December 31, 2010.

C. Proposed LAER Determination

LAER Option Proposed:	**NOx - 5.0 ppmvd at 15% O2 during natural gas firing of combustion turbines & duct burners**

Justification:	**Lowest permitted NOx emission rate for a combined cycle combustion turbine firing ULSD. See Att. G discussion for further detail.**

B. LAER Information

Complete this table for each LAER listed in Part III.A of this form.

LAER Option: NOx - meet NSPS Subpart IIII limit for emergency engines

Unit Description	Emergency Generator Engine and Emergency Fire Pump Engine
Facility/Location	Green Energy Partners/Stonewall LLC / Leesburg, VA
Permitting Authority with Contact Information	Virginia Department of Environmental Quality
Permit No.	73826
Capacity (specify units)	15.4 MMBtu/hr (generator), 2.54 MMBtu/hr (fire pump)
LAER Determination	Good combustion practices
Compliance Achieved?	☐ Yes ☒ No
Method of Compliance Determination	None
Post-LAER Emissions Rate (specify units)	N/A
Reference	Green Energy Partners/Stonewall LLC, Commonwealth of Virginia Department of Environmental Quality, Prevention of Significant Deterioration Permit, Non-Attainment New Source Review Permit, Stationary Source Permit to Construction and Operate, Registration Number 73826, April 30, 2013.

C. Proposed LAER Determination

LAER Option Proposed:	**NOx - meet NSPS Subpart IIII limit for emergency engines**

Justification:	**Lowest permitted NOx emission rate for ULSD fired emergency engines. See Att. G discussion for further detail.**

ATTACHMENT 215-B ANALYSIS OF ALTERNATIVES

This attachment provides an analysis of alternatives for the CPV Towantic Energy Center (the Project). The Project is currently fully permitted as a 512-megawatt (MW) combined-cycle natural gas-fired electric generating facility, after extensive reviews by state and local agencies and subsequent appeals. As a part of that approval process considerable review occurred by the Connecticut Siting Council (CSC) to evaluate alternatives and confirm that the Project provided an appropriate balance of environmental and community impacts with the need for a reliable and efficient source of energy.

The following sections consider alternatives for the Project as currently proposed, addressing the extent to which its benefits outweigh its adverse environmental impact, including secondary impacts, cumulative impacts, and social costs. As required by CTDEEP, consideration of alternative sites, alternative Project sizes, and technologies are discussed. Lastly, environmental control techniques and technology are summarized, with cross-referencing to Attachment G, which includes a detailed demonstration of Lowest Achievable Emission Rate (LAER) and Best Available Control Technology (BACT) for the Project.

1.0 ALTERNATIVE SITES

A robust consideration of alternative sites was included in the 1998 CSC application for the Project, and the Oxford site was selected based on its balance of favorable attributes. The Town of Oxford had recently added acreage to its industrial zone, and views the Project as an “anchor” tenant. The 20-acre Oxford site was directly proximate to both suitable electric and natural gas infrastructure. Water and sewer infrastructure would be extended directly within the industrial park roadway abutting the site. The following conclusions were made in the CSC application supporting selection of this site for the Project:

- The site, its location, existing infrastructure, environment and topography are characteristics that are conducive to Project development without adverse impacts to the public and the environment.
- Oxford town officials’ support is enthusiastic and receptive, since the Project meets several of the town’s objectives for its industrial development plan for the area.
- The site requires no new construction of natural gas pipelines or electric transmission lines, nor does it present a significant burden on the existing water and sewer capacities of Oxford or the surrounding area.
- Since the Oxford area and surrounding region is a net importer of energy, the Project is more likely to service existing and projected electric needs for the area and region in which it is located.

The CSC recognized these advantages in approving the project.

In the years since the Project’s initial CSC and air permit approvals, energy and financial market conditions have changed, with favorable conditions currently supporting the Project updates and planned construction. The favorable attributes of the site remain, and have been further improved since the original approvals through construction of Woodruff Hill Road and development of the Woodruff Hill Industrial Park, with utility piping extended to the site and a compatible industrial use (the Spectra compressor station) located immediately to the east. An additional 6 acres of industrially zoned land within the industrial park has been optioned for the Project to utilize the entire property to the north of the compressor station access drive and allow for layout optimization.

2.0 ALTERNATIVE SIZES OR ALTERNATIVE PROCESSES

2.1 Alternative Size/Project Output

As noted above, existing Project approvals reflect a 512-MW generating capability. The proposed Project update incorporates General Electric (GE) H technology to allow for generation of a nominal 805 MW using a similar design and footprint. The updated output for the Project reflects the optimal size to meet current ISO New England needs within the energy market. Note that, although the Project remains similar in physical size, adjustments have been made in specific equipment size reflecting the updated technology as well as considerations for reducing visual and downwash effects (e.g., shorter air cooled condenser, three smaller building enclosures instead of one larger building enclosure).

2.2 Alternative Generation Technologies

The CSC application for the Project evaluated a thorough list of potential generation technologies, and affirmed that combined-cycle technology utilizing natural gas as its primary fuel not only presented economic and efficiency advantages, demonstrated in practice, but was a favorable option from an environmental and acceptability perspective. CPV focuses on clean energy solutions, and also develops renewable energy facilities throughout the U.S. and Canada. However, in this region, on-shore renewable resources are not sufficiently robust to support a commercial-scale energy facility, and energy storage solutions do not yet allow for reliable power generation across the potential demand spectrum. Natural gas combined-cycle technology, as proposed, is an effective companion for renewable energy, with its ability for flexible operation and rapid starts. Combined-cycle technology utilizing natural gas as its primary fuel remains the most favorable option today from a market point of view. This was recently demonstated by ISO New England's choice of a gas-fired combined-cycle facility as the forward capacity market's proxy unit. This technology also maximizes energy efficiency and minimizes air emissions.

2.3 Alternative Fuels

The CSC application for the Project considered a range of alternatives. As noted above, wind and solar renewable energy are not currently able to support commercial energy generation at this scale. Other fossil fuels, such as coal and oil burning facilities, result in greater levels of emissions, as well as potential social impacts associated with fuel delivery and/or storage. Natural gas, delivered via pipeline located adjacent to the site, eliminates the need for road or rail delivery, and provides efficient combustion in combined-cycle mode resulting in the lowest emissions for all fossil fuels. In selecting a backup fuel, in order to support the most reliable Project possible, the use of ultra-low sulfur distillate (ULSD) presents the lowest emitting option of liquid fuels available, and is able to be utilized by the same combustion process and equipment.

2.4 Alternative Cooling Technologies

A natural gas-fired combined-cycle electric generating facility requires cooling, particularly for the condensing of turbine exhaust steam in the steam turbine condensers. The range of cooling technologies was evaluated in the CSC application, with air cooling selected for the Project. Other cooling options such as once-through cooling and wet cooling, utilize significant greater water volume. In a community for which water conservation is a priority, selection of air-cooled condensing technology was appropriate. In considering updates to the Project, CPV investigated the range of currently available technology and has incorporated a design that reduces the size and height of the air-cooled condenser (even with the greater energy output), reducing visibility as well as the effect of downwash.

2.5 Environmental Control Technique and Technology Review

A detailed LAER/BACT demonstration analysis is provided in Section G of this application. As outlined in that section, the Project has selected advanced pollution control technologies and add-on controls to achieve low levels of emissions when operating both with its primary fuel (natural gas) and its backup source (ULSD). In addition, the Project has continued to integrate technology improvements, for example, adding an oxidation catalyst in the recertification of BACT that occurred in 2010. The Project will employ dry-low NO_x combustion, selective catalytic reduction, an oxidation catalyst and good combustion practices utilizing the latest techniques and technologies.

2.6 Summary and Conclusion

The CSC review of the Project incorporated a robust and thorough consideration of the range of alternatives. The Project as proposed reflects the use of an appropriate site, the most efficient generating technology, clean fuels, and state-of-the-art pollution controls for a Project of the optimal size for successful participation in the current ISO New England forward capacity and energy markets. Air quality impacts associated with the Project will comply with National Ambient Air Quality Standards and PSD Increments, which have been established for the protection of the most sensitive members of the population. Benefits of the Project area associated with its efficient, reliable energy production and presence as an anchor tenant in a planned industrial park area. Employment opportunities associated with construction and operation will have secondary beneficial effects throughout the local community, and the Project will contribute substantial financial support to the local community. Beneficial cumulative effects will result from displacement of older, less efficient generating units. The Project has incorporated the best available alternatives in order to balance its impacts and create a beneficial source of electrical generation.

Attachment 215-D - Offsetting Emission Reductions or Emission Reduction Credits Determination

Documentation is required to be provided for each non-attainment pollutant demonstrating that the planned use of any internal offsets comply with the requirements of RCSA section 22a-174-3a(*l*)(4)(B) and that certified emission reduction credits comply with the requirements of RCSA section 22a-174-3a(*l*)(5).

In accordance with the requirements of RCSA section 22a-174-3a(l)(5), the emission reduction credits (ERCs) must satisfy the following requirements:

A. Created and used in accordance with 40 CFR 51;

B. Real, that is, resulting in a reduction of actual emissions, net of any consequential increase in actual emissions resulting from shifting demand. The emission reductions shall be measured, recorded and reported to the commissioner;

C. Quantifiable, based on either stack testing approved by the commissioner in writing, conducted pursuant to an appropriate, reliable, and replicable protocol approved by the commissioner, or continuous emissions monitoring certified by the commissioner. Such quantification shall be in terms of the rate and total mass amount of non-attainment pollutant emission reduction;

D. Surplus, not required by any Connecticut General Statute or regulation adopted thereunder, or mandated by the State Implementation Plan, and not currently relied upon for any attainment plan, any Reasonable Further Progress plan or milestone demonstration;

E. Permanent, in that at the source of the emission reduction, the emission reduction system shall be in place and operating, and an appropriate record keeping system is maintained to collect and record the data required to verify and quantify such emissions reductions; and

F. Enforceable and approved by the commissioner in writing after the submission to the commissioner of documents satisfactory to the commissioner or incorporated into a permit as a restriction on emissions.

The Project is required to hold 233.6 ERCs to offset the 194.7 tons per year of NO_X emissions from the Project in accordance with the requirements of 22a-174-3a(l)(5). As noted in the current permit (Permit #144-0011), the Project currently holds 177 ERCs; therefore, the Project will require an additional 56.6 NO_X ERCs.

The additional NO_X ERCs will be created prior to the date the Project becomes operational, and will come from an area in Connecticut or New York that is designated as an equal or higher nonattainment classification than the Project area. Prior to operation of the Project, CPV Towantic will provide documentation to DEEP that it has acquired the additional ERCs, along with the documentation necessary to verify that the additional 56.6 ERCs meet all of the requirements of RCSA section 22a-174-3a(l)(5).

ATTACHMENT K – OPERATION AND MAINTENANCE PLAN

Since DEEP has not requested an Operation and Maintenance Plan, and no other permit or order requires it, Attachment K is not required.

ATTACHMENT L – AMBIENT AIR QUALITY ANALYSIS

Provided on the following pages is a completed Ambient Air Quality Analysis, consistent with RCSA sections 22a-174-3a(d)(3)(B) & (C).

This attachment includes information cross-referenced in prior attachments, including:

- Attachment 216-D: Found in Section 3.8
- Attachment 216-E: Found in Section 3.2
- Attachment 216-F: Found in Section 3.8
- Attachment 216-G: Found in Section 4.2 and 4.3
- Attachment 216-H: Found in Section 4.4
- Attachment 215-C: Found in Section 4.4

Ambient Air Quality Analysis

CPV Towantic Energy Center

September 2014

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TETRA TECH

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APPENDICES

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ºF	degrees Farenheit
$\mu g/m^3$	micrograms per cubic meter
ACC	air-cooled condenser
AERMOD	USEPA-approved steady-state air quality dispersion model
AQRV	Air Quality Related Value
BPIP	Building Profile Input Program
CEMS	continuous emissions monitoring system
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CPV	CPV Towantic, LLC
CTG	combustion turbine generator
DEEP	Connecticut Department of Energy and Environmental Protection
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
g/s	grams per second
GE	General Electric
GEP	good engineering practice
GHG	greenhouse gases
H1H	highest first highest
HRSG	heat recovery steam generator
K	Kelvin
km	kilometers
kV	kilovolt
kW	kilowatt
MASC	maximum allowable stack concentration
m/s	meters per second
MMBtu/hr	million British thermal units per hour
msl	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAD83	North American Datum of 1983
NH_3	ammonia

Acronyms/Abbreviations	Definition
NNSR	Nonattainment New Source Review
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPS	National Park Service
NSR	New Source Review
O_3	ozone
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
ppm	parts per million
ppmw	parts per million weight
Project	A nominal 805-MW natural gas-fired, combined-cycle generating facility located at Woodruff Hill Road in Oxford, Connecticut
PSD	Prevention of Significant Deterioration
SCR	selective catalytic reduction
SIA	Significant Impact Area
SILs	Significant Impact Levels
SO_2	sulfur dioxide
STG	steam turbine generator
tpy	tons per year
ULSD	ultra-low sulfur distillate
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VISCREEN	USEPA-approved plume visibility model
VOC	volatile organic compounds

1.0 INTRODUCTION

CPV Towantic, LLC (CPV) proposes to construct and operate a nominal 805-megawatt (MW) combined-cycle electric generating facility at a site located on Woodruff Hill Road in Oxford, Connecticut (the Project). The United States Geological Survey (USGS) map provided in Attachment D of this application, illustrates the general location of the Project. Construction of the proposed Project is scheduled to begin in December 2015 and continue for a period of approximately 30 months. Commercial operation is expected to commence in June 2018.

The proposed Project will include two combustion turbine generators (CTGs), each with an independent supplementary-fired heat recovery steam generator (HRSG), an auxiliary boiler, an emergency diesel generator, and a fire pump diesel engine. The Project will be fired primarily with natural gas; the use of ultra-low sulfur distillate (ULSD) will be authorized for up to 30 days per year as the backup fuel. The purpose of this report is to present the air quality dispersion modeling analyses performed in support of the Prevention of Significant Deterioration (PSD) permit application to the Connecticut Department of Energy and Environmental Protection (DEEP) for criteria pollutants. The modeling analyses were conducted in accordance with the methodologies described in correspondence with the DEEP submitted on June 19, 2014.

This report consists of four sections in addition to this introduction.

- Section 2 contains a Project description, including information regarding the facility's location and the expected air pollutant emissions, along with an applicability assessment relative to key permit-related regulations.
- Section 3 presents a detailed description of the modeling analyses undertaken to evaluate the air quality impacts of the proposed Project, including: model selection criteria; good engineering practice (GEP) stack height determination and building dimensions for model input; meteorological data; refined modeling analyses; and the ambient air quality compliance assessment, along with the modeling results.
- Section 4 discusses additional PSD analyses such as Class I Area Air Quality Related Values (AQRVs), visibility, growth, and impacts to vegetation and soils.
- Section 5 provides the references that were used in preparing this report.

The appendices include detailed source parameter data and supporting vendor data, a description of the facility building layout and Building Profile Input Program (BPIP) analysis results, detailed AERMOD results data, background inventory source data, VISCREEN results, and detailed soils and vegetation analysis data.

The modeling analyses demonstrate that the Project is in compliance with all applicable ambient air quality standards and PSD increments.

2.0 PROJECT DESCRIPTION

The equipment layout and exact location of the facility is illustrated in the Site Plan and USGS map provided in Attachments C and D of this application, respectively.

2.1 SITE LOCATION

The proposed Project will be constructed on a 26-acre parcel at a greenfield location in Oxford, Connecticut. The site is located in western New Haven County, approximately 3 miles southwest of Naugatuck, Connecticut, approximately 5 miles southwest of Waterbury, Connecticut, approximately 0.5 mile east of the Waterbury-Oxford Airport, and approximately 2 miles south of Interstate 84. The site will have a graded elevation of 830 feet above mean sea level (msl) elevation. The nearest terrain with elevations reaching stack-top height (980 feet msl) is located approximately 12 miles north-northwest of the proposed facility stack location.

2.2 FACILITY DESCRIPTION

The proposed nominal 805 MW[1] combined-cycle electric generating facility will be configured as two operating units. The power plant will be configured in a "2-on-1" power block configuration with steam from the two HRSGs feeding a single steam turbine generator (STG). The HRSGs will be equipped with supplementary firing (duct burners) to provide additional generating capacity during periods of peak electrical demand. The facility is designed to run as a base load plant with both combustion turbines operating concurrently, but will have the capability of operating with a single combustion turbine and at part load operation.

The Project will include a variety of power plant equipment including two General Electric (GE) 7HA.01 CTGs; one STG; two HRSGs with selective catalytic reduction (SCR) and oxidation catalyst emissions control equipment; generator step-up transformers; an electrical switchyard; an ammonia (NH_3) storage tank; water tanks; and an air-cooled condenser (ACC). The Project will be fired primarily with natural gas, but will have the ability to run on back-up ULSD as necessary, for up to 720 hours per year. In addition, the Project will include other buildings for administrative and operating staff; warehousing of parts and consumables; and maintenance shops and equipment servicing.

The first stage in the generation process of a combined-cycle power plant is the operation of the CTGs. Thermal energy, in the form of hot exhaust gas, is produced in the CTGs through the combustion of fuel (natural gas or ULSD). The hot exhaust gases are then converted into mechanical energy by a turbine that drives a generator. The exhaust gas temperature exiting the CTGs is in excess of 1,000 degrees Fahrenheit (°F) and still has remaining a significant amount of recoverable heat energy. This heat energy is recovered in the HRSG by generating steam that is sent to the STG to generate additional electrical energy. The generation of electricity using both a combustion turbine and steam turbine defines the combined cycle, which is the most efficient form of electrical generation available. The efficiency of the facility is further enhanced by using reheat systems, as well as waste energy to heat feedwater in the HRSG through an additional economizer loop and also for fuel preheating. Once the steam leaves the STG, it is condensed back into water using an ACC, and this condensed water is returned to the HRSGs to minimize water use. Additional steam, and consequently additional electricity, may be generated when

[1] Based on 59°F ambient temperature, 60% relative humidity, and duct firing.

required by the use of supplemental natural gas-fired burners (duct burners) within the HRSGs. The CTGs will also be equipped with inlet air evaporative cooling.

Pollutant emissions from the Project will be minimized through the use of natural gas as the primary fuel to be fired in the CTGs and duct burners. Fifteen parts per million (ppm) ULSD oil will be fired as a backup fuel as necessary for up to 720 hours per year. Each HRSG will be equipped with SCR and an oxidation catalyst to reduce emissions of nitrogen oxides (NO_x), and carbon monoxide (CO) and volatile organic compounds (VOC), respectively. The SCR system will utilize 19% aqueous NH_3 as the reagent in the SCR systems. Continuous emissions monitoring systems (CEMS) will continuously sample, analyze, and record exhaust gas concentrations of NO_x, CO, and NH_3 from each of the two HRSG exhaust stacks. The CEMS will be installed and operated in accordance with United States Environmental Protection Agency (USEPA) and DEEP requirements and will generate emissions data reports that will confirm consistency with permit requirements and send alarm signals to plant supervisory and control systems when emissions approach or exceed permitted limits.

Ancillary equipment at the proposed Project will include three additional fuel combustion emission units:

- A 92.4-million British thermal units per hour (MMBtu/hr) natural gas-fired auxiliary boiler equipped with ultra-low NO_x burners;
- A 2,206-brake horsepower emergency generator firing ULSD oil; and
- A 315-kilowatt (kW) emergency fire pump engine firing ULSD oil.

To support the SCR systems, a 20,000-gallon aboveground storage tank will contain 19% aqueous NH_3. The tank will be located within a concrete containment structure along with the ammonia transfer pumps, valves, and piping.

The Project will interconnect with the existing 115-kilovolt (kV) transmission line that crosses the northwest portion of the site via a new switchyard. Natural gas will be delivered via a new connection to the existing pipeline located adjacent to the north of the site.

2.3 AMBIENT AIR QUALITY REGULATORY CRITERIA

The USEPA and the DEEP have promulgated regulations that establish ambient air quality standards and PSD increments. These standards and increments provide the basis for an evaluation of the potential impacts of the Project on ambient air quality.

2.3.1 National Ambient Air Quality Standards

The USEPA has developed National Ambient Air Quality Standards (NAAQS) for six air contaminants, known as criteria pollutants, for the protection of public health and welfare. These criteria pollutants are sulfur dioxide (SO_2), particulate matter,[2] nitrogen dioxide (NO_2), CO, ozone (O_3), and lead (Pb). The DEEP has also adopted these limits. The NAAQS have been developed for various durations of exposure. The NAAQS for short-term periods (24 hours or less) typically refer to pollutant levels that cannot be exceeded except for a limited number of cases per year. The NAAQS for long-term levels typically refer to pollutant levels that cannot be exceeded for exposures averaged typically over one year. As shown on Table L-1, the NAAQS include both “primary” and “secondary” standards. The primary

[2] Particulate matter (PM) is characterized according to size. PM having an effective aerodynamic diameter of 10 microns or less is referred to as PM_{10}. PM having an effective aerodynamic diameter of 2.5 microns or less is referred to as $PM_{2.5}$, or “fine particulate.” $PM_{2.5}$ is a subset of PM_{10}.

standards are intended to protect human health and the secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants.

One of the basic goals of federal and state air pollution regulations is to ensure that ambient air quality, including the impact of background, existing sources, and new sources, is in compliance with ambient air quality standards. Toward this end, for each criteria pollutant, every area of the United States has been designated as one of the following categories: attainment, unclassifiable, or nonattainment, with respect to each NAAQS. In areas designated as attainment, the air quality is equal to or better than the NAAQS. These areas are under a mandate to maintain, i.e., prevent significant deterioration of, such air quality.

In areas designated as unclassifiable, there are limited air quality data, and those areas are treated as attainment areas for regulatory purposes.

In areas designated as nonattainment, the air quality is worse than the NAAQS. These areas must take actions to improve air quality and attain the NAAQS within a certain period of time.

The Project site area is presently classified as “attainment” or “attainment/unclassifiable” (combined definition) for all pollutants except O_3,for which it is a serious nonattainment area. . Thus, emissions of the pollutants SO_2, NO_x, CO, and PM_{10}/$PM_{2.5}$ are evaluated under the PSD program.

If a new major source of air pollution is proposed, it must undergo New Source Review (NSR). There are two NSR programs: one for sources being built in attainment/unclassifiable areas, and one for sources in nonattainment areas. The NSR program for sources in attainment/unclassifiable areas is known as the PSD program. The NSR program for sources being built in nonattainment areas is known as the Nonattainment New Source Review (NNSR) program.

Major sources of the O_3 precursors, NO_x and VOC, are subject to the NNSR program, and the proposed Project is a major source of NO_x.since annual potential emissions exceed 50 tons per year (tpy)

2.3.2 Prevention of Significant Deterioration Review

The PSD Program is a federally mandated review of new major sources of criteria pollutants designed to maintain the NAAQS and prevent degradation of air quality in attainment/unclassifiable areas. Review authority for the PSD program has been delgated by the USEPA to the DEEP for all pollutants.

For PSD purposes, a combined-cycle electric generating facility is considered a major source if emissions of any one criteria pollutant are greater than 100 tpy or if emissions of greenhouse gases (GHG) expressed as carbon dioxide (CO_2) equivalent (or CO_{2e}) are greater than 100,000 tpy. As shown in Table L-2, the facility will have potential emissions greater than 100 tpy for one or more attainment criteria pollutants and potential emissions greater than 100,000 tpy of CO_{2e}. Therefore, the proposed facility will be a major PSD source. For a major PSD source, PSD regulations also apply to each criteria pollutant that is emitted in excess of a defined significant emission rate.

Table L-2 presents a PSD major source threshold analysis for the facility for those pollutants with applicable PSD emission criteria. As shown in Table L-2, the facility is subject to PSD review for PM/PM_{10}/$PM_{2.5}$, NO_x, CO, VOC, sulfuric acid mist, and GHGs. Since there are no NAAQS for VOC or GHGs, a modeling analysis for those pollutants is not a PSD permit application requirement; therefore, they are not addressed in this report. Sulfuric acid is treated as an air toxic; as such, a maximum allowable stack concentration analysis is included in the air permit application and is not the subject of modeling. Therefore, it is not addressed further in this report.

Table L-1. National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS Primary Standard ($\mu g/m^3$)	NAAQS Secondary Standard ($\mu g/m^3$)
SO_2	Annual[a, j]	80	NA
	24-Hour[b, j]	365	NA
	3-Hour[b]	NA	1,300
	1-hour[i]	196	NA
PM_{10}	24-Hour[d]	150	150
$PM_{2.5}$	Annual[e]	12	15
	24-Hour[f]	35	35
CO	8-Hour[b]	10,000	NA
	1-Hour[b]	40,000	NA
O_3	8-Hour (2008 Standard)[g]	150	150
	8-Hour (1997 Standard)[g, h]	157	157
NO_2	Annual[a]	100	100
	1-hour[c]	188	NA
Pb	Rolling 3-month[a]	0.15	0.15

a Not to be exceeded.
b Not to be exceeded more than once per year.
c Compliance based on 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area.
d. Not to be exceeded more than once per year on average over 3 years.
e Compliance based on 3-year average of weighted annual mean $PM_{2.5}$ concentrations at community-oriented monitors.
f Compliance based on 3-year average of 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.
g Compliance based on 3-year average of fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area.
h The 1997 8-hour O_3 standard and associated implementation rules remain in place as the transition to the 2008 standard occurs.
i Compliance based on 3-year average of 99th percentile of the daily maximum 1-hour average at each monitor within an area.
j The 24-hour and annual average primary standards for SO_2 will remain in effect until one year after the effective date of the 1-hour SO_2 designations.

$\mu g/m^3$ = micrograms per cubic meter

Table L-2. PSD Regulatory Threshold Evaluation

Pollutant	Project Annual Emissions (tons)	PSD Major Source Threshold (tons)	PSD Significant Emission Rate (tons)	PSD Review Applies
CO	136.4	100	100	Yes
NO_x	196.2	100	40	Yes
SO_2	39.7	100	40	No
PM	154.7	100	25	Yes
PM_{10}	154.7	100	15	Yes
$PM_{2.5}$	154.7	100	10	Yes
VOC	49.9	100	40	Yes
Pb	0.034	100	0.6	No
Sulfuric Acid Mist	25.3	100	7	Yes
GHGs (as CO_{2e})	2,678,612	100,000	75,000	Yes

3.0 AIR QUALITY IMPACT ASSESSMENT

3.1 INTRODUCTION

The dispersion modeling analyses for the Project have been conducted in accordance with USEPA (2005) and DEEP (2009) guidance, as well as the detailed methodology description submitted by email to the DEEP on June 19, 2014.

As described in Section 2.3.2, the Project will be a major source subject to PSD regulations for CO_{2e}, CO, NO_X, PM, PM_{10}, $PM_{2.5}$, VOC and sulfuric acid mist. Dispersion modeling has been conducted for CO, NO_2, PM, PM_{10}, and $PM_{2.5}$ to demonstrate compliance with the NAAQS and PSD increments; for completeness, SO_2 has also been modeled.

The dispersion modeling for this Project has been conducted with the EPA and DEEP recommended AERMOD dispersion model, in a manner that evaluates worst-case operating conditions in an effort to predict the highest impact for each pollutant and averaging period. Maximum predicted impacts from the worst-case scenarios are compared to the Significant Impact Levels (SILs). If maximum predicted impacts are below the corresponding SILs, then compliance is demonstrated and no additional analysis is necessary. However, if predicted impacts are greater than the SILs, a cumulative impact analysis has been conducted with other major emission sources in the area, as identified by the DEEP (with DEEP's Radius Search Tool and subsequent correspondence with DEEP). The results of the cumulative modeling are compared to the NAAQS, and PSD increments. Table L-3 provides the SILs, NAAQS and PSD increments along with the modeling rank basis used for assessment of the various thresholds. All electronic modeling files have been provided to the DEEP.

Table L-3. SILs, NAAQS, and PSD Increments

Pollutant	Averaging Period	Rank for SIL Assessment	SIL ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)	Rank for NAAQS/PSD Assessment
NO_2	1-hour	H1H[1] (5-year Average)	7.5	188	NA	H8H (5-year Average)
	Annual	H1H	1	100	25	H1H
CO	1-hour	H1H	2,000	40,000	NA	H2H
	8-hour	H1H	500	10,000	NA	H2H
PM_{10}	24-hour	H1H	5	150	30	H6H
	Annual	HH	1	NA	17	H1H
$PM_{2.5}$ (NAAQS))	24-hour	H1H (5-year Average)	1.2	35	NA	H8H (5-year Average)
	Annual	H1H (5-year Average)	0.3	12	NA	H1H (5-year Average)
$PM_{2.5}$ (PSD)	24-hour	H1H	1.2	NA	9	H2H
	Annual	H1H	0.3	NA	4	H1H
SO_2	1-hour	H1H (5-year Average)	7.8	196	NA	H4H (5-year Average)
	3-hour	H1H	25	1,300	512	H2H
	24-hour	H1H	5	365	91	H2H
	Annual	H1H	1	80	20	H1H

[1] H1H = highest first highest, H2H = highest second highest, etc.

The $PM_{2.5}$ SILs were vacated on January 22, 2013 by the United States Court of Appeals for the District of Columbia Circuit (*Sierra Club v. USEPA*). However, as will be discussed in Section 3.8, existing ambient monitoring data representative of ambient background for the Project area indicate that there is sufficient margin between the ambient background levels and the NAAQS to allow use of the $PM_{2.5}$ SILs as a demonstration of compliance with the NAAQS. The SIL is only approximately 10% of this margin. Predicted Project impacts below the SILs would ensure protection of the NAAQS and, therefore, the $PM_{2.5}$ SILs are proposed to be used for this analysis.

3.2 SOURCE DATA AND OPERATING SCENARIOS [ATTACHMENT 216-E]

The modeling analyses for the Project include the combustion turbine units, the emergency diesel generator, the fire pump diesel engine, and the auxiliary boiler. Air quality dispersion modeling has been conducted for a range of operating scenarios to capture worst-case potential impact concentrations from the combustion turbine units. Table L-4 summarizes stack characteristics for the combustion turbine stacks and ancillary sources.

Tables L-5 and L-6 provide emission rates and stack parameters that bracket the full range of normal operating loads for natural gas-fired and oil-fired conditions, respectively.

Table L-7 provides worst-case emission rates and stack parameters under startup conditions. The start-up parameters are based on worst-case emissions and stack parameters considering the hot start, warm start, and cold start-up conditions, as well as shutdown conditions.

Table L-8 provides the stack parameters for the emergency diesel generator, fire pump engine, and the auxiliary boiler.

The turbines were first modeled alone to determine worst-case load conditions for each pollutant and averaging period. The turbines under worst-case load conditions were then modeled in combination with the ancillary units to determine total Project impacts. Note that the auxiliary boiler will not operate simultaneously with the combustion turbines except during brief periods when operation overlaps with a single turbine startup. The emergency generator and fire pump engines will operate for emergencies and for testing, which will normally consist of operation one time per week for up to one hour.

Table L-4. Stack Characteristics

Parameter	Combustion Turbine Stacks	Emergency Generator Stack	Fire Pump Engine Stack	Auxiliary Boiler
Base Elevation, msl (feet/meters)	830/252.98	830/252.98	830/252.98	830/252.98
Stack Height (feet/meters)	150/45.72	14.5/4.42	17.5/5.33	62/18.9
Inside Stack Diameter (feet/meters)	22/6.71	1.2/0.37	0.7/0.21	4.0/1.22
Number of Stacks	2	1	1	1
Stack Location: UTM[a]-E (m), UTM-N(m) (in NAD83, zone 14)	1) 656815.8, 4594161.2 2) 656775.3, 4594151.0	656729.2, 4594234.2	656748.5, 4594146.3	656687.5, 4594203.9

[a]UTM – Universal Transverse Mercator

Table L-5. Load Scenarios and Emission Rates for a General Electric (GE) 7HA.01 Combustion Turbine Firing Natural Gas (per unit)

Parameter	Units	GE Design Cases																		
		#1	#2	#3	#4	#28	#29	#35	#9	#31	#32	#11	#36	#13	#14	#16	#17	#23	#24	#22
Ambient Temperature	°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	59°F	59°F	59°F	59°F	59°F	90°F	90°F	100°F	100°F	100°F	100°F	100°F	100°F
CTGs Operating	--	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Percent Load Rate	%	100%	100%	100%	100%	75%	50%	100%	100%	75%	50%	30%	100%	100%	100%	100%	100%	75%	50%	41%
Duct Burner Operation	--	Fired	Fired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Unfired	Fired	Unfired	Fired	Fired	Unfired	Unfired	Unfired	Unfired
Stack Temperature	Kelvin (K)	356.4	360.3	349.8	364.5	360.7	355.6	352.2	357.2	355.5	354.8	349.8	359.1	364.4	364.9	349.8	368.0	364.9	360.9	357.0
Stack Exit Velocity	m/s	18.42	18.59	18.30	18.78	14.94	11.81	16.94	17.13	14.04	11.53	8.86	15.93	16.64	16.68	16.15	16.77	13.43	10.88	9.56
NO_x Emission Rate	g/s	2.633	2.533	3.377	2.444	1.953	1.512	2.495	2.318	1.827	1.399	1.058	2.318	2.192	2.369	2.936	2.192	1.613	1.246	1.115
CO Emission Rate	g/s	1.361	1.310	1.739	0.669	0.534	0.413	1.251	0.634	0.501	0.383	0.290	1.197	0.602	1.229	1.512	0.600	0.440	0.341	0.305
SO_2 Emission Rate	g/s	0.611	0.588	0.782	0.565	0.458	0.354	0.585	0.543	0.431	0.328	0.249	0.543	0.516	0.556	0.686	0.514	0.378	0.293	0.262
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	2.52	2.457	2.570	1.226	1.158	1.104	2.558	1.215	1.144	1.090	1.050	2.407	1.201	2.533	2.268	1.200	1.116	1.072	1.056

Table L-6. Load Scenarios and Emission Rates for a GE 7HA.01 Combustion Turbine Firing ULSD (per unit)

Parameter	Units	GE Design Cases											
		#37	#46	#47	#38	#41	#52	#53	#42	#43	#44	#51	#45
Ambient Temperature	°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	59°F	59°F	59°F	90°F	100°F	100°F	100°F	100°F
CTGs Operating	--	2	1	2	2	2	2	2	2	2	1	2	2
Percent Load Rate	%	100%	100%	75%	50%	100%	75%	50%	100%	100%	100%	75%	50%
Duct Burner Operation	--	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Stack Temperature	K	424.4	417.9	411.1	405.5	419.0	406.7	404.5	417.5	423.2	409.5	410.4	411.1
Stack Exit Velocity	m/s	21.82	21.41	16.91	13.40	20.98	16.00	12.24	19.76	19.95	18.09	14.46	11.49
NO_x Emission Rate	g/s	6.552	5.859	5.254	4.032	6.199	4.901	3.780	5.771	5.746	5.368	4.322	3.352
CO Emission Rate	g/s	1.600	1.424	1.273	0.982	1.512	1.194	0.921	1.411	1.399	1.310	1.051	0.816
SO_2 Emission Rate	g/s	0.620	0.620	0.497	0.383	0.587	0.464	0.358	0.547	0.544	0.508	0.408	0.318
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	5.368	5.368	5.292	5.242	5.342	5.279	5.229	5.330	5.317	5.305	5.254	5.204

Table L-7. Startup Condition Stack Parameters for Each Fuel

Operating Load Case	Natural Gas	ULSD
Stack Exhaust Velocity (m/s)	7.67	10.30
Stack Exhaust Temperature (K)	344.1	344.1
CO (g/s)	30.49	29.106
NO_x (g/s)	0.33	0.37
SO_2 (g/s)	0.33	0.36
Note: The startup parameters presented and evaluated with modeling are the worst-case emissions and flows over range of hot, warm, and cold start, and shutdown conditions. Startup conditions were considered for pollutants and averaging periods of 8 hours or less. Consistent with USEPA guidance for intermittent conditions, the NO_X emission rates are annualized for 250 starts per turbine per year.		

Table L-8. Stack Parameters for Ancillary Equipment

Parameter	Emergency Diesel Generator	Fire Pump Engine	Auxiliary Boiler
Stack Exhaust Velocity (m/s)	51.82	27.30	7.91
Stack Exhaust Temperature (K)	891.8	789.3	399.8
Short Term Emission Rates:			
CO (g/s)	0.2696	0.0788	0.4304
NO_x (g/s)	2.5001	0.3325	0.1272
PM / PM_{10} / $PM_{2.5}$ (g/s)	0.0184	0.0114	0.0815
SO_2 (g/s)	0.0027	0.0005	0.0175
Annual Emission Rates:			
CO (g/s)	0.0092	0.0027	0.1965
NO_x (g/s)	0.0856	0.0114	0.0581
PM / PM_{10} / $PM_{2.5}$ (g/s)	$6.296e\ 10^{-4}$	$3.90e\ 10^{-4}$	0.0372
SO_2 (g/s)	$9.25e\ 10^{-5}$	$1.58e\ 10^{-5}$	0.0008
Note: Annual emission rates based 4,000 hours per year operation for the auxiliary boiler and 300 hours per year for the diesel generator and fire pump engines.			

3.3 MODEL SELECTION

The USEPA-recommended AERMOD modeling system (USEPA 2004) has been used to conduct the dispersion modeling. The most current versions of the model have been used (AERMOD version 14134, AERMAP version 11103).

3.4 METEOROLOGICAL DATA

The modeling has been conducted using five years (2008-2012) of meteorological data collected, processed and provided by the DEEP. The surface data are from the Danbury Municipal Airport in Danbury, Connecticut and the corresponding upper air data are from Albany, New York. The surface station is located approximately 32.5 kilometers (km) (20.3 miles) west-southwest from the Project site. It is representative of the Project site area because of its relatively close proximity and similar distance from the coastline. A windrose plot describing the wind speed and wind wind direction frequency distribution for this data is provided in Figure L-1.

3.5 LAND USE

A land-use determination has been made following the classification technique suggested by Auer (Auer 1978) in accordance with USEPA/DEEP modeling guidance. The classification technique was conducted to determine the predominant land use (urban versus rural) in the area for the dispersion characteristics, by assessing land-use categories within a 3-km radius of the proposed site. Figure L-2 provides an aerial view of the 3-km radius around the proposed Project site. Inspection of this aerial photo, other maps, and on-site inspection, indicates that the large majority of the area is characterized as rural. Therefore, rural dispersion coefficients have been used for the air quality modeling.

3.6 GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

Good Engineering Practice (GEP) stack height is defined as “the height necessary to ensure that emissions from the stack do not results in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies or wakes which may be created by the source itself, nearby structures, or nearby terrain obstacles.” A GEP stack height analysis has been performed based on the facility structures to determine the potential for building-induced aerodynamic downwash for the proposed stacks. The analysis procedures described in USEPA’s Guidelines for Determination of Good Engineering Practice Stack Height (USEPA 1985) and DEEP guidance have been used.

The GEP formula height is based on the observed phenomena of disturbed atmospheric flow in the immediate vicinity of a structure resulting in higher ground-level concentrations at a closer proximity to the building than would otherwise occur. It identifies the minimum stack height at which significant aerodynamic downwash is avoided. The GEP formula stack height, as defined in the 1985 guidelines, is calculated as follows:

$$H_{GEP} = H_{BLDG} + 1.5L$$

Where:

- H_{GEP} is the calculated GEP formula height;
- H_{BLDG} is the height of the nearby structure; and
- L is the lesser dimension (height or projected width) of the nearby structure.

Both the height and width of the structure are determined from the frontal area of the structure projected onto the plane perpendicular to the direction of the wind. The GEP stack height is based on the plane projected from any structure that results in the greatest calculated height. For the purpose of the GEP analysis, nearby refers to the “sphere of influence” defined as 5 times L (the lesser dimension [height or projected width] of the nearby structure), downwind from the trailing edge of the structure.

In order to limit visual impact and due to proximity to the Waterbury Oxford airport, the stack heights for the Project will be limited to 150 feet, which is less than the GEP height. Therefore, the USEPA’s BPIP (Dated: 04274) version that is appropriate for use with the PRIME algorithms in AERMOD was used to evaluate downwash effects in the model. The building dimensions and coordinates for each potentially influencing structure were input in BPIPPRM program to determine direction-specific building data. The PRIME algorithms calculate the entire configuration of the structure’s wake from the cavity immediately downwind of the structure to the far wake. Schematic diagrams, which describe the site building configuration along with the BPIP input and output data, are provided in Appendix L-B.

3.7 RECEPTOR GRID AND AERMAP PROCESSING

Discrete receptors were placed at 25-meter intervals along the facility fence line. In addition, a nested Cartesian grid was extended out from the fence line at the following receptor intervals and distances:

- At 25-meter intervals from the fence line to 300 meters;
- At 100-meter intervals from the 300 meters to 2,000 meters;
- At 500-meter intervals from 2,000 to 5,000 meters;
- At 1,000-meter intervals from 5,000 to 10,000 meters; and
- At 2,000-meter intervals from 10,000 to 20,000 meters.

Terrain elevations at receptors were determined using BEE-Line Software's BEEST program and USGS digital terrain data. BEEST implements the AERMAP model, which includes processing routines that extract National Elevation Data at 10-meter spacing based on North American Datum of 1983 (NAD83). The four nearest data points surrounding each receptor have been used to determine receptor terrain elevations (by interpolation) for air quality model input.

For any cases where the maximum model concentrations were predicted beyond the dense (100-meter intervals) portion of the grid, and the predicted concentration exceeded 75% of the applicable standard, supplemental receptors were placed around the initial maximum location (at the next lower grid spacing interval) to ensure higher concentrations were not overlooked.

3.8 AMBIENT BACKGROUND DATA [ATTACHMENT 216-D AND 216-F]

As previously stated, if AERMOD-predicted maximum-impact concentrations are significant (above SILs), multi-source modeling has been conducted. In the multi-source modeling analysis, representative ambient air quality background concentrations are added to modeled concentrations from the cumulative modeling to compare against the NAAQS. Representative ambient air quality data and the selected background concentrations that were used in the compliance assessment are provided in Table L-9.

DEEP monitoring data were reviewed to identify representative monitoring sites and determine ambient background concentrations for the Project area. The monitoring site selections considered proximately to the Project area, and similarity of the monitoring site environment to the relatively rural Project site area.

In general, the monitors located closest to the facility were used to establish existing background levels. The ambient data for CO and SO_2 come from the Criscuolo Park monitor located in New Haven. New Haven is an industrialized area and the monitor is located about 1 km away from a major highway (I-95). Therefore, the data from the monitoring site are conservatively representative of ambient background concentrations for the relatively rural project site area. The ambient data for PM_{10}/$PM_{2.5}$ come from the Meadow and Bank Street monitor located in Waterbury. This monitoring site is urban/residential in character and is located just 170 meters south of a major highway (I-84). Therefore, the data from the monitoring site are conservatively representative of ambient background concentrations for the relatively rural project site area. The ambient data for NO_2 come from the McAuliffe Park monitor located in East Hartford. This monitoring site is suburban/residential in character and is located just 120 meters east of Route 5, 2.0 km east of I-91, and 2.5 km south of I-291. Therefore, the data from the monitoring site are conservatively representative of ambient background concentrations for the relatively rural project site area. For these reasons, the ambient monitoring data presented in Table L-9 are representative of the Project site area ambient background.

Table L-9. Ambient Air Quality Monitoring Data and Selected Background Concentrations

Pollutant	Averaging Period	Rank	Monitor	Background Concentration ($\mu g/m^3$)
CO	1-hour	2nd high	A	1725
	8-hour	2nd high	A	1380
NO_2	1-hour	98th percentile	B	87
	Annual	Mean	B	21
$PM_{2.5}$	24-hour	98th percentile	C	24
	Annual	Mean	C	9.2
PM_{10}	24-hour	2nd high	C	40
SO_2	1-hour	99th percentile	A	87
	3-hour	2nd high	A	92
	24-hour	2nd high	A	84
	Annual	Mean	A	29

Monitor Key:
A = Criscuolo Park, New Haven, CT (ID# 09-009-0027)
B = McAuliffe Park, East Hartford, CT (ID# 09-009-1003)
C = Meadow and Bank Streets, Waterbury, CT (ID# 09-009-2123)

3.9 POTENTIAL SECONDARY $PM_{2.5}$ FORMATION ASSESSMENT

The analysis of $PM_{2.5}$ impacts is consistent with recent USEPA guidance on $PM_{2.5}$ permit modeling (USEPA 2013). Since the Project has an annual potential-to-emit of direct $PM_{2.5}$ and NO_x both greater than their respective significant emission rate thresholds, air quality impacts from both primary and secondary $PM_{2.5}$ emissions must be assessed. Impacts of primary $PM_{2.5}$ emissions have been determined with dispersion modeling using AERMOD. The guidance indicates that the Project falls in the Case 3 Assessment category, where secondary $PM_{2.5}$ can be assessed by either a qualitative, hybrid qualitative/quantitative, or full quantitative approach.

Since no suitable existing photochemical modeling study has been identified to use for a hybrid $PM_{2.5}$ assessment, a qualitative assessment has been used to assess potential secondary $PM_{2.5}$ impacts for the Project. The qualitative approach is analogous to the example qualitative approach described in the recent draft $PM_{2.5}$ guidance. Specific details are summarized below:

1. Model-predicted impacts indicate primary $PM_{2.5}$ impacts will be located very close to the Project (either at the facility fence line or within a few 100 meters of the fence). Secondary $PM_{2.5}$ impacts are expected to be very low (negligible) near where-model predicted primary $PM_{2.5}$ impacts are highest, because there is not enough time for secondary chemical reactions to occur. Conversely, what limited secondary $PM_{2.5}$ emissions may form will occur far from the Project site and where the primary $PM_{2.5}$ impacts will be lowest. This makes it highly unlikely that maximum $PM_{2.5}$ primary and secondary impacts will occur at the same time and place.

2. There will be a relatively small amount of precursor emissions from the Project when compared to the existing source emissions in the region, especially for SO_2 where Project emissions are less than the significant emission rate threshold.

3. The ambient background $PM_{2.5}$ monitoring data are quality assured and account for secondary $PM_{2.5}$ from regional emission sources. There is no indication that secondary formation of $PM_{2.5}$ from existing regional sources is causing or contributing to a violation of the NAAQS.
4. DEEP's Mohawk Mt. monitor (USEPA AIRS monitor 09-005-0005) located in Litchfield County could also be considered a representative monitor for $PM_{2.5}$ ambient background data and this monitor has $PM_{2.5}$ speciation data available. These speciated $PM_{2.5}$ data were reviewed and it was determined that, over the last three-year period (2011-2013), the fraction of total nitrate to total $PM_{2.5}$ is just 8.8% on an average annual basis. Given that the proposed NO_x emissions for the Project are a small fraction of the NO_x emissions in the airshed, and that the ambient monitoring data show relatively small fractions of nitrates, secondary $PM_{2.5}$ formation from the proposed NO_x emissions would be expected to be considerably smaller than the monitored concentration of nitrates. The monitoring information supports the conclusion that the secondary $PM_{2.5}$ formation will be negligible and would not be expected to cause a NAAQS or PSD increment exceedance.

For the reasons stated above, it is believed that detailed quantification of secondary $PM_{2.5}$ is not needed in order to determine that emissions of $PM_{2.5}$ precursors from the Project, together with emissions of primary $PM_{2.5}$, will not cause or contribute to violations of the $PM_{2.5}$ NAAQS.

3.10 MODELING ANALYSIS AND SIGNIFICANT IMPACT AREA (SIA) DETERMINATION

The modeling analysis has been conducted using AERMOD along with the set of representative meteorological data as described in Section 3.4. The analysis was conducted to demonstrate compliance with the NAAQS and PSD increments. If maximum impacts from the Project's criteria pollutant emissions are predicted to exceed their associated SILs shown in Table L-3, a refined cumulative modeling analysis with additional major sources was conducted to determine compliance with the NAAQS and PSD increments. The full range of turbine operating conditions described in Table L-5 through Table L-7 was evaluated to determine worst-case loads (highest impact concentrations) for each pollutant and averaging period. Detailed results of this analysis are provided in Appendix L-C.

The turbines under worst-case load conditions were then modeled along with the other Project emissions sources (engines and auxiliary boiler) to determine total Project impacts. Note that the auxiliary boiler will not operate simultaneously with the turbines, except for brief periods during turbine startup. The case of a turbine in startup mode along with the auxiliary boiler operating and the case of the turbine in startup along with the second turbine in normal operation have been assessed with modeling. Operation of the turbines simultaneously with the diesel generator and fire pump engine has also been assessed. Annualized emission rates corresponding with 300 hours per year operation for the diesel engines were used for assessment with annual standards. The emergency diesel and fire pump engines will typically only operate for testing one hour per week. Turbine startup conditions will be less than one hour in duration and be limited to 250 per turbine per year, but are expected to occur much less frequently.

Consistent with USEPA guidance for intermittent sources, the engines were excluded from the analysis for the statistically based 1-hour NO_2 and 1-hour SO_2 standards. Also consistent with USEPA guidance, NO_x emissions for the intermittent startup conditions were annualized based on 250 hours per year operation, which corresponds to a maximum of 250 starts per turbine per year.

The AERMOD results for the Project are summarized in Table L-10. Detailed results for the analysis are also provided in Appendix L-C. As shown in Table L-10, maximum predicted impact concentrations are less than SILs for all pollutants except 1-hour and annual NO_2, and 24-hour $PM_{2.5}$. Compliance with NAAQS and PSD increments is demonstrated for pollutants with predicted insignificant (less than SIL) impacts, therefore, no additional modeling for these pollutants is necessary.

Table L-10. Maximum Predicted Impact Concentrations

Pollutant	Averaging Period	Rank Basis for SIL Assessment	Impact Concentration (µg/m^3)	SIL (µg/m^3)	Extent of SIA (km)	NAAQS (µg/m^3)	PSD Class II Increment (µg/m^3)
NO_2	1-hour	H1H (5-year Average)	12.9	7.5	0.82	188	NA
	Annual	H1H	1.4	1	0.45	100	25
CO	1-hour	H1H	301.9	2000	NA	40,000	NA
	8-hour	H1H	176.3	500	NA	10,000	NA
PM_{10}	24-hour	H1H	4.2	5	NA	150	30
	Annual	H1H	0.290	1	NA	NA	17
$PM_{2.5}$ (NAAQS)	24-hour	H1H (5-year Average)	3.5	1.2	1.58	35	NA
	Annual	H1H (5-year Average)	0.21	0.3	NA	12	NA
$PM_{2.5}$ (PSD)	24-hour	H1H	4.2	1.2	3.09	NA	9
	Annual	H1H	0.290	0.3	NA	NA	4
SO_2	1-hour	H1H (5-year Average)	2.7	7.8	NA	196	NA
	3-hour	H1H	1.4	25	NA	1300	512
	24-hour	H1H	0.5	5	NA	365	91
	Annual	H1H	0.03	1	NA	80	20

Notes:
Maximum highest first highest (H1H) concentrations are used for comparison with the SILs. Impact concentrations are based on maximum predicted across the range of 5 years modeled for all pollutants except $PM_{2.5}$ (both annual and 24-hour), NO_2 (1-hour only), and SO_2 (1-hour only), which are based on the maximum 5-year average H1H values. NO_2 concentrations conservatively assume 100% NO_x to NO_2 conversion. $PM_{2.5}$ SIL assessment relative to PSD increment compliance is based on H1H concentrations prediction over the range of 5 years modeled, rather than the 5-year average concentrations that are used for the NAAQS assessment.

Cumulative modeling has been conducted for pollutants with Project impacts that exceed their respective SILs to demonstrate compliance with the NAAQS and PSD increments. Cumulative modeling for 1-hour and annual NO_2, and 24-hour $PM_{2.5}$ is described in Section 3.11. Note that there is no PSD increment for 1-hour NO_2, so no increment assessment is necessary for this averaging period.

3.11 CUMULATIVE IMPACT MODELING

As described in Section 3.10, maximum predicted impact concentrations for 1-hour and annual NO_2, and 24-hour $PM_{2.5}$ exceed their respective SILs. Therefore, a cumulative modeling analysis including other regional emissions sources and existing ambient background concentrations has been conducted. The source inventory was based on the DEEP Radius Search Tool for 2008 Air Emissions Inventory Data, provided by DEEP. The Radius Search Tool was used to develop an inventory of sources located within 50 km of the project. DEEP guidance, based on distance and actual annual emissions levels, was used to select from the inventory the specific sources to be included in the cumulative modeling assessment.

Only one NO_X source met the DEEP criteria for inclusion in the cumulative NO_2 NAAQS analysis. Three additional NO_X sources met the criteria for inclusion in the annual NO_2 PSD increment consumption analysis. No inventory sources of PM met the criteria for inclusion in the cumulative modeling assessment for NAAQS compliance for $PM_{2.5}$. In addition, because the Project is the first $PM_{2.5}$ source to "trigger" PSD review in the region, no other PM sources need to be considered in the PSD increment consumption analysis.

The NO_x sources modeled cumulatively with the Project are as follows:

- Bridgeport Harbor Generating Station, Bridgeport, Connecticut
  - Generator #3 – Actual NO_x = 2,111.9 tpy, Distance from Project = 35.2 km (NAAQS and PSD)
- Algonquin Gas Transmission, Oxford, Connecticut
  - Turbine #1 – Actual NO_x = 1.1 tpy, Distance from Project = 0.112 km (PSD only)
  - Turbine #2 – Actual NO_x = 0.3 tpy, Distance from Project = 0.112 km (PSD only)
  - Turbine #3 – Actual NO_x = 0.2 tpy, Distance from Project = 0.112 km (PSD only)

Detailed emissions and stack parameter data for these sources are provided in Appendix L-D, along with more details on the source inventory selection criteria.

Table L-11 presents the results of the cumulative NAAQS compliance assessment. This assessment includes the predicted cumulative impacts of the facility and background inventory source plus representative ambient background concentrations for all receptors and time periods where the Project has a significant impact. As shown in Table L-11, the resulting total concentrations are less than the corresponding NAAQS concentrations for all pollutants. The predicted NO_2 concentrations conservatively assume a 100% conversion rate of NO_X to NO_2 for 1-hour concentrations. Detailed results of the modeling analysis are provided in Appendix L-C.

Table L-11. Cumulative NAAQS Compliance Assessment

Pollutant	Averaging Period	Cumulative Impact Concentration[1] (μg/m³)	Ambient Background (μg/m³)	Total Impact Plus Background (μg/m³)	NAAQS (μg/m³)
NO_2	1-Hour	81.8	87	168.8	188
	Annual	1.9	21	22.9	100
$PM_{2.5}$	24-hour	3.5	24	27.5	35

Notes: Total cumulative impact concentrations based on consideration of all receptors and time periods where the Project has a predicted significant impact concentration (based on 5-year average maximum H1H and lower-ranked concentrations for 1-hour NO_2 and 24-hour $PM_{2.5}$). NO_2 concentrations conservatively assume 100% NO_X to NO_2 conversion.

3.12 PSD INCREMENT CONSUMPTION ANALYSIS

The PSD program requires a demonstration that the proposed facility, in combination with other PSD increment-consuming emission sources (as described in Section 3.11), will comply with the maximum allowable PSD "increment." This analysis is required because the Project is subject to PSD review and also has maximum predicted impacts greater than the corresponding SILs.

Table L-12 presents the results of the PSD increment compliance assessment for 24-hour $PM_{2.5}$ and annual NO_2. Note that there is no PSD increment for 1-hour NO_2. Detailed results for the analysis are also provided in Appendix L-C.

Table L-12. Cumulative PSD Increment Compliance Assessment

Pollutant	Averaging Period	Total Increment Consumption[1] (μg/m³)	Maximum Allowable PSD Increment (μg/m³)
NO_2	Annual	2.4	25
$PM_{2.5}$	24-hour	4.2	9

[1] Impact concentrations are conservatively based on the maximum highest first highest (H1H) concentration predicted across the range of modeled years.

4.0 EVALUATION OF ADDITIONAL IMPACTS

In accordance with PSD regulations, additional impacts must be addressed for projects subject to PSD review. The additional PSD impact analyses involving air quality modeling are discussed in this section.

4.1 CLASS I AREA AIR QUALITY RELATED VALUES

The nearest PSD Class I Areas to the Project is as follows:

- Lye Brook National Wilderness Area, Vermont – located approximately 175 km from the Project.
- Brigantine National Wildlife Refuge, New Jersey – located approximately 250 km from the Project.

The Federal Land Managers' (FLM) Air Quality Related Values Work Group (FLAG) has implemented initial screening criteria to determine whether impacts to Class I areas from sources greater than 50 km away would be considered negligible for all AQRVs, including visibility. The screening criteria are detailed in FLAG's October 2010 Phase I Report (United States Forest Service [USFS] et al. 2010). The FLAG Phase I Report was produced as a collaborative report by the FLMs in the USFS, National Park Service , and United States Fish and Wildlife Service (collectively "the Agencies"). The details of the screening criteria are given below.

> *…the Agencies will consider a source locating greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NO_X, PM_{10}, and H_2SO_4 [sulfuric acid] annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources* (USFS et al. 2010).

The combined annual potential-to-emit for SO_2, NO_x, PM_{10}, and sulfuric acid for the Project (based on 24-hour maximum emissions), is approximately 918 tpy. The approximate distance to the Lye Brook National Wilderness Area is 175 km. The resulting Q/D value of 5.2 is well below the screening level of 10. Therefore, no additional analysis of Class I area impacts is required for the Project.

4.2 VISIBILITY [ATTACHMENT 216-G]

CPV will comply with the particulate and visible emissions requirements specified in Section 22a-174-18 of the Regulations of Connecticut State Agencies. Compliance with these regulations will address the intent of the PSD plume blight visibility requirements.

The VISCREEN model was used to assess potential visibility impacts at the closest Class I Area, the Lye Brook National Wilderness Area (175 km away). The Project's maximum potential emissions were used in the analysis. The results (provided in Appendix L-E) indicate that the visibility impairment related to the Project's plume will not exceed threshold criteria.

4.3 SOILS AND VEGETATION [ATTACHMENT 216-G]

The USEPA guidance document for soils and vegetation, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (USEPA 1980), established a screening methodology for comparing air quality modeling impacts to "vegetation sensitivity thresholds." These methods were used to evaluate potential impacts on vegetation and soils.

4.3.1 Vegetation Assessment

As an indication of whether emissions from the Project will significantly impact the surrounding vegetation (i.e., cause acute or chronic exposure to each evaluated pollutant), the modeled predicted impact concentrations are compared against both a range of injury thresholds found in the guidance, as well as those established by the NAAQS secondary standards.

The Project site is located within Connecticut's Southern Hills-Central Hardwoods zone, and the Southwest Hills ecoregion (Dowhan and Craig 1976). Dominant tree species in the area include a variety of: oaks (*Quercus rubra, Q. alba,* and *Q. velutina*); hickories *(Carya ovate, C. cordiformis, C. glabra, and C. olvis*); tulip poplar (*Liriodendron tulipifera*); black birch *(Betula lenta*); white ash (*Fraxinus americana*); and eastern hemlock (*Tsuga canadensis*). Typical forest understories in the area contain species such as: cinnamon fern (*Osmunda cinnamomea*); sensitive fern (*Onclea sensibilis*); arrowood viburnam (*Viburnum recognitum*); and raspberry (*Rubus sp.*). Nonforested tracts within the area are typical of active and former agricultural fields with prevalent species such as: purple clover (*Trifolium pratense*); timothy (*Phleum pretense*); quack grass (*Arropyron repens*); goldenrod (*Solidago canadensis, S. gigantean, and S. tenufolia*); tall nettle (*Urtica procera*); Queen Anne's lace (*Daucus carota*); milkweed (*Asclepias sp.*); and asters (*Aster sp.)*. The species prevalent in the area are common and do not represent vegetation that would be expected to be more sensitive than those used by USEPA to establish the screening concentrations provided in Table L-13.

Table L-13. Vegetation Impact Screening Thresholds Assessment

Pollutants	Averaging Period	Maximum Project Impacts ($\mu g/m^3$)	NAAQS Secondary Standards ($\mu g/m^3$)	EPA's 1980 Screening Concentrations ($\mu g/m^3$)
SO_2	1-hour	2.7	NA	917
	3-hour	1.4	1300	786
	Annual	0.03	NA	18
NO_2	4-hour	12.9 (1-hour)[1]	NA	3760
	1-month	12.9 (1-hour)[1]	NA	561
	Annual	1.4	100	94
CO	1-week	176.3 (8-hour)[1]	NA	1,800,000 (weekly)
PM_{10}	24-hour	4.2	150	None
$PM_{2.5}$	24-hour	4.2	35	None
	Annual	0.290	15	

[1] **Conservatively based on shorter-term average predicted concentration.**

Since the NAAQS secondary standards were set to protect public welfare, including protection against damage to crops and vegetation, comparing modeled emissions to these standards provides some indication if potential impacts are likely to be significant. Table L-13 lists the Project impact concentrations and compares them to the vegetation sensitivity thresholds and NAAQS secondary standards. All pollutant impact concentrations are well below the vegetation sensitivity thresholds.

4.3.2 Soil Assessment

The USEPA Screening Procedure also provides a method for assessing impacts on soils. This assessment evaluates trace element contamination of soils. Since plant and animal communities can be affected before noticeable accumulation occurs in the soils, the approach used here evaluates the way soil acts as an intermediary in the transfer of a deposited trace elements to plants. For trace elements, the concentration deposited in the soil is calculated from the maximum-predicted annual ground-level concentrations conservatively assuming that all deposited material is soluble and available for uptake by plants. The amount of trace elements potentially taken up by plants is calculated using average plant-to-soil concentration ratios. The calculated soil and plant concentrations were then compared to screening concentration threshold criteria designed to assess potential adverse effects to soils and plants.

Soils in the Project area were generally formed in glacial till sediments that were derived from gneissic and schistose metamorphic parent material. Soils proximate to the Project site are primarily represented by two soil series, the Paxton series and the Woodbridge series. Smaller amounts of soils from the Ridgebury series are also found near watercourses and wetlands. The Paxton and Woodbridge soils are typically coarse to fine sandy loams containing coarse to gravelly materials, and are moderately well drained. Ridgebury soils are typically poorly drained fine sandy loams, formed in compact glacial till. None of the soils prevalent in the area would necessitate use of criteria differing from those considered in USEPA's screening assessment methodology, shown in Table L-14.

Table L-14 presents the results of the potential soil and plant concentrations and compares them to the corresponding screening concentration criteria. Only pollutants that are potentially emitted from the Project and which have a screening concentration are presented. A calculated concentration in excess of either of the screening concentration criteria is an indication that a more detailed evaluation may be required. However, as shown in Table L-14, calculated concentrations as a result of operation of the Project are all well below the screening criteria. Detailed calculations are provided in Appendix L-F.

Table L-14. Soils Impact Screening Assessment

Pollutant	Maximum Project Deposited Soil Concentration (ppmw)	Soil Screening Criteria (ppmw)	Percent of Soil Screening Criteria	Plant Tissue Concentration (ppmw)	Plant Screening Criteria (ppmw)	Percent of Plant Screening Criteria
Arsenic	8.39E-03	3	0.3	1.17E-03	0.25	0.5
Cadmium	3.10E-02	2.5	1.2	3.32E-01	3	11.1
Chromium	6.32E-02	8.4	0.8	1.26E-03	1	0.1
Lead	4.77E-02	1000	0.0	2.15E-02	126	0.0
Manganese	2.22E+00	2.5	88.8	1.47E-01	400	0.0
Mercury	7.36E-03	455	0.0	3.68E-03	NA	NA
Nickel	4.76E-02	500	0.0	2.14E-03	60	0.0
Selenium	7.07E-02	13	0.5	7.07E-02	100	0.1
Note: Based on screening procedures described in Chapter 5 of the USEPA guidance document for soils and vegetation, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*. (USEPA 1980)						

4.4 GROWTH [ATTACHMENT 216-H AND 215-C]

A growth analysis examines the potential emissions from secondary sources associated with the Project. While these activities are not directly involved in Project operation, the emissions involve those that can reasonably be expected to occur; for instance, industrial, commercial, and residential growth that will occur in the Project area due to the Project itself. Secondary emissions do not include any emissions that come directly from mobile sources, such as emissions from the tailpipe of any on-road motor vehicle or the propulsion of a train. They also do not include sources that do not impact the same general area as the source under review.

The Project is expected to have a construction workforce reflecting 300 – 500 jobs over the approximately 2 ½ year construction period. A significant portion of the regional construction force in the area of the site is currently available to build the Project. However, it is possible that a small percentage of the labor force will be from outside the commuting region, and may create a small new housing demand. However, it is expected that any new housing demand can be met with existing housing stock in the region. In addition, it is expected that no induced commercial or industrial construction in the area will be necessary to support the Project. The operations staff will consist of approximately 21 to 25 workers, and will not significantly influence growth in the area. Therefore, an evaluation of secondary emission sources associated with the Project is not warranted.

5.0 REFERENCES

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USEPA 2013. *Draft Guidance for $PM_{2.5}$ Permit Modeling*, Steven D. Page, March 2013.

USFS, NPS, and USFWS 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG): Phase 1 Report, Revised. Natural Resource Report NPS/NRPC/NRR – 2010/232. October 2010.

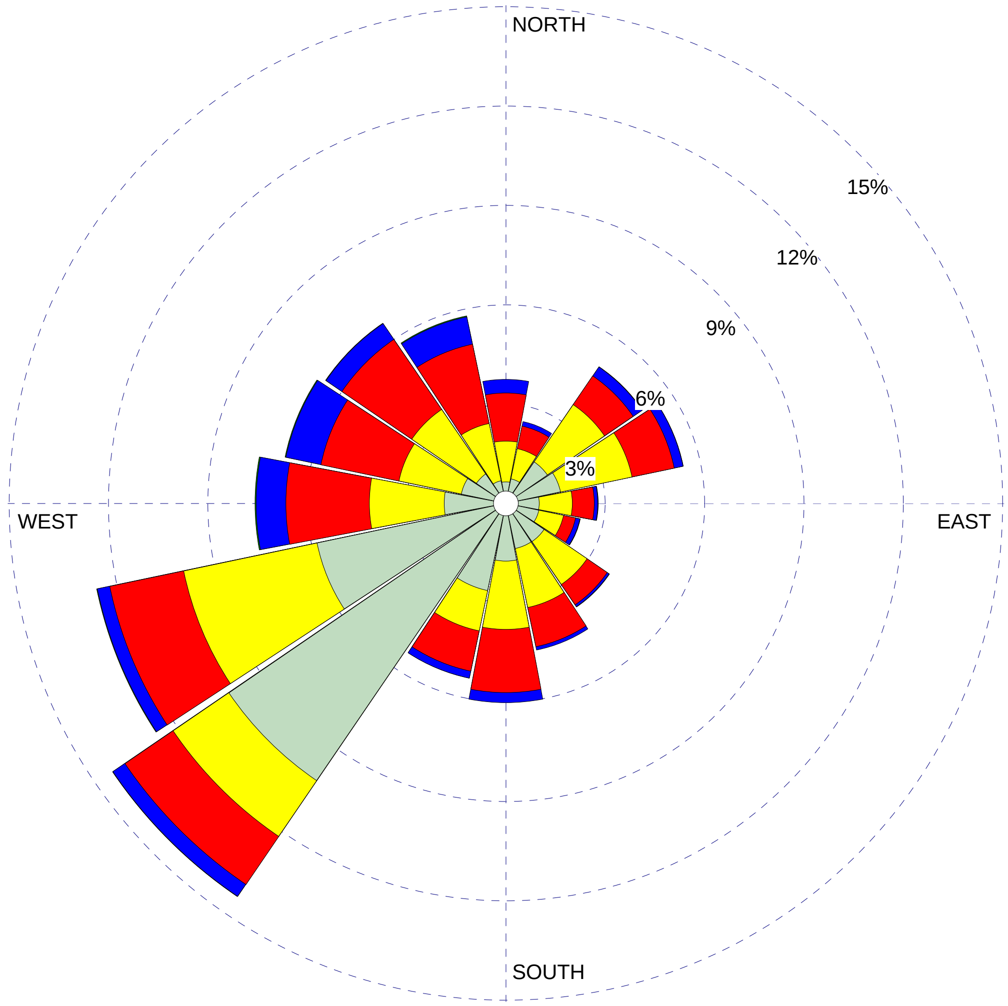
FIGURES

WIND ROSE PLOT:

CPV Towantic Energy Center
Wind Rose Plot for Danbury Municipal Airport, CT (2008-2012)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

Wind Rose Plot for Danbury Municipal Airport Meteorological Data (2008-2012)

DATA PERIOD:

Start Date: 1/1/2008 - 00:00
End Date: 12/31/2012 - 23:00

CALM WINDS:

4.86%

WIND SPEED (Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 4.86%

Figure L-1

Wind Rose Plot

PROJECT NO.:

Towantic

TOTAL COUNT:

43587 hrs.

DATE:

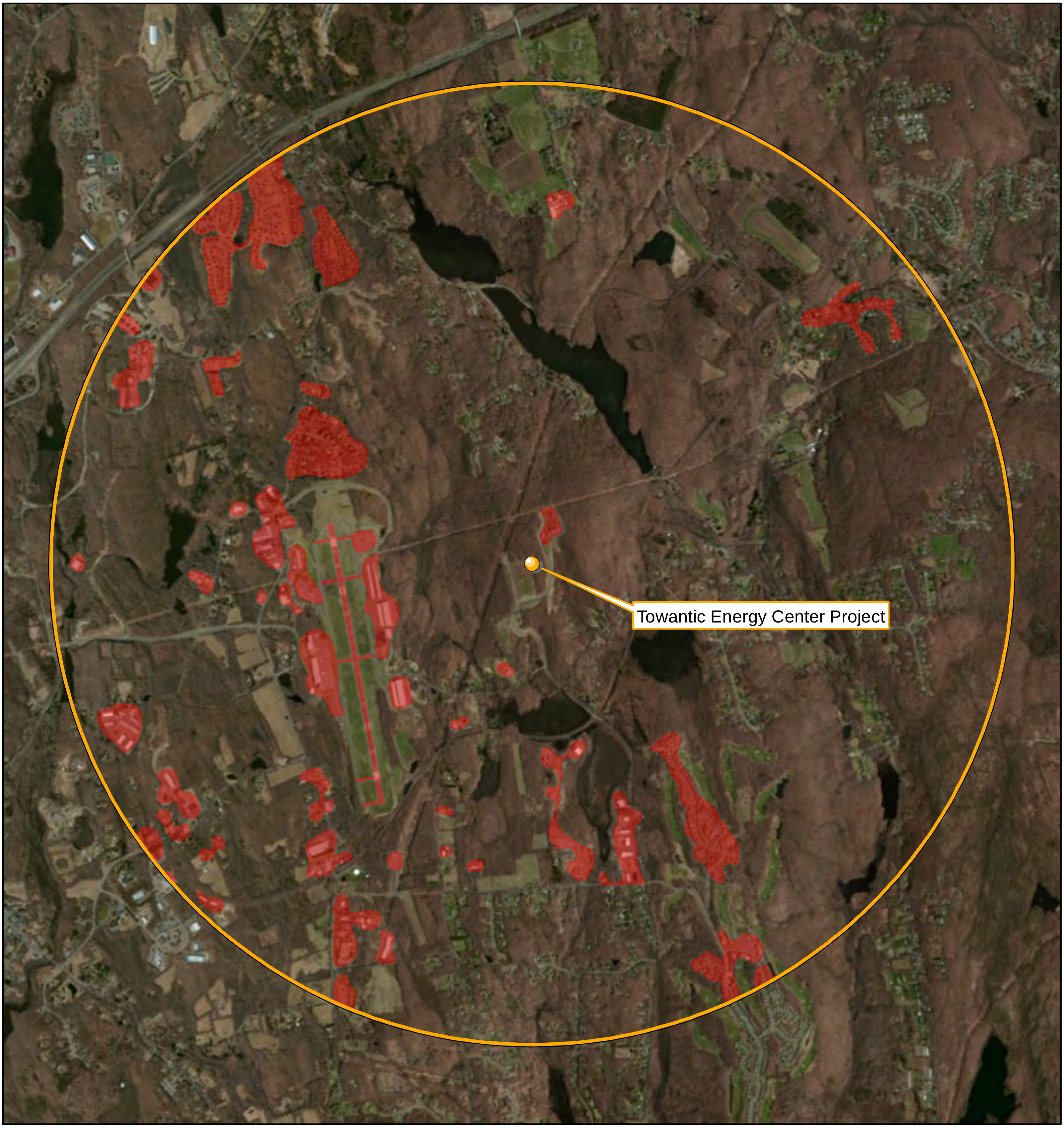
9/4/2014

AVG. WIND SPEED:

5.49 Knots

TETRA TECH

WRPLOT View - Lakes Environmental Software



N
W E
S

0 4,000
Feet

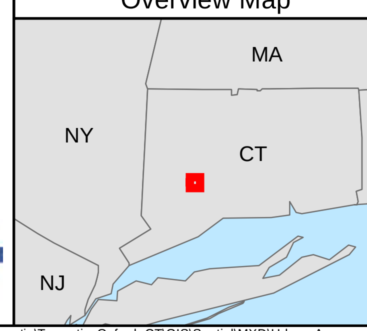
Figure L-2

Urban / Rural Land Use Determination Map

Towantic Energy Center Project
3km Buffer of Power Station
Urban Area

TETRA TECH

Overview Map



Document Path: P:\GIS\Guertin\Towantic_Oxford_CT\GIS\Spatial\MXD\Urban_Areas.mxd

APPENDIX L-A: DETAILED SOURCE PARAMETER DATA

CPV Towantic Energy, LLC - 7HA01 Combustion Turbine Emissions Data For Modeling

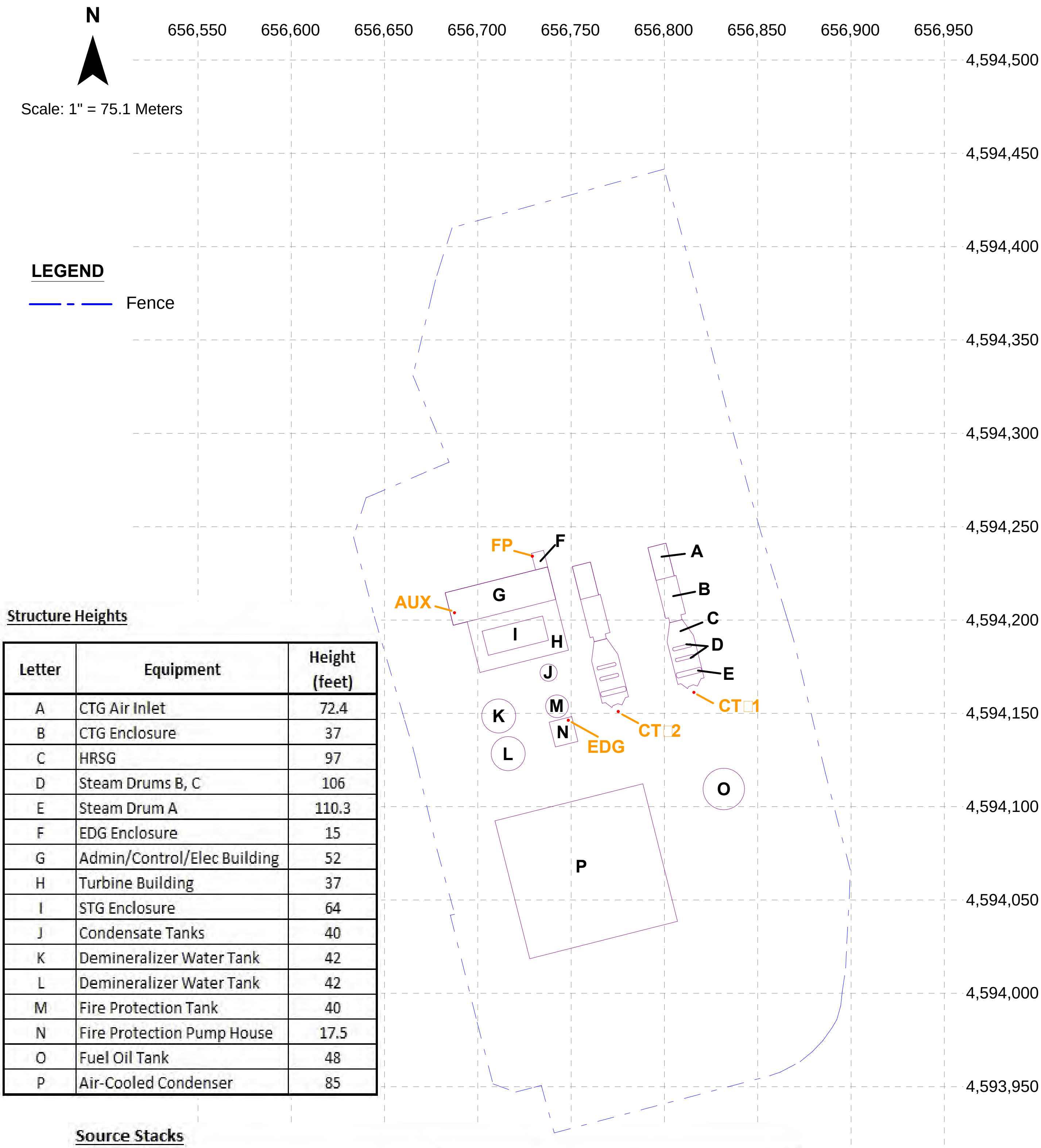
Parameter	Units	GE Design Cases																		
		#1	#2	#3	#4	#28	#29	#35	#9	#31	#32	#11	#36	#13	#14	#16	#17	#23	#24	#22
Fuel	N/A	**Natural Gas**																		
Ambient Temperature	°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	59°F	59°F	59°F	59°F	59°F	90°F	90°F	100°F	100°F	100°F	100°F	100°F	100°F
Number of GTs Operating	--	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
Percent Load Rate	%	BASE	BASE	BASE	BASE	75%	50%	BASE	BASE	75%	50%	30%	BASE	BASE	BASE	BASE	BASE	75%	50%	41%
Duct Burner Operation	--	Fired	Fired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Unfired	Fired	Unfired	Fired	Fired	Unfired	Unfired	Unfired	Unfired
Stack Diameter	feet	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Co-located Eq Diameter	feet	31.11	31.11	N/A	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	N/A	31.11	31.11	31.11	31.11
Stack Height	feet	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Stack Temperature	°K	356.4	360.3	349.8	364.5	360.7	355.6	352.2	357.2	355.5	354.8	349.8	359.1	364.4	364.9	349.8	368.0	364.9	360.9	357.0
Stack Flow Rate	m^3/s	650.8	656.9	646.4	663.5	528.0	417.3	598.7	605.2	495.9	407.5	313.1	562.8	587.8	589.4	570.7	592.4	474.7	384.3	337.7
Stack Exit Velocity	m/s	18.42	18.59	18.30	18.78	14.94	11.81	16.94	17.13	14.04	11.53	8.86	15.93	16.64	16.68	16.15	16.77	13.43	10.88	9.56
Stack Exit Velocity	fps	60.4	61.0	60.0	61.6	49.0	38.7	55.6	56.2	46.0	37.8	29.1	52.2	54.6	54.7	53.0	55.0	44.1	35.7	31.4
NO_x Emission Rate	g/s	2.633	2.533	3.377	2.444	1.953	1.512	2.495	2.318	1.827	1.399	1.058	2.318	2.192	2.369	2.936	2.192	1.613	1.246	1.115
CO Emission Rate	g/s	1.361	1.310	1.739	0.669	0.534	0.413	1.251	0.634	0.501	0.383	0.290	1.197	0.602	1.229	1.512	0.600	0.440	0.341	0.305
SO_2 Emission Rate	g/s	0.611	0.588	0.782	0.565	0.458	0.354	0.585	0.543	0.431	0.328	0.249	0.543	0.516	0.556	0.686	0.514	0.378	0.293	0.262
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	2.520	2.457	2.570	1.226	1.158	1.104	2.558	1.215	1.144	1.090	1.050	2.407	1.201	2.533	2.268	1.200	1.116	1.072	1.056

CPV Towantic Energy, LLC - 7HA01 Combustion Turbine Emissions Data For Modeling

Parameter	Units	GE Design Cases											
		#37	#46	#47	#38	#41	#52	#53	#42	#43	#44	#51	#45
Fuel	N/A	**Distillate Oil**											
Ambient Temperature	°F	-14.2°F	-14.2°F	-14.2°F	-14.2°F	59°F	59°F	59°F	90°F	100°F	100°F	100°F	100°F
Number of GTs Operating	--	2	1	2	2	2	2	2	2	2	2	2	2
Percent Load Rate	%	BASE	BASE	75%	50%	BASE	75%	50%	BASE	BASE	BASE	75%	50%
Duct Burner Operation	--	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Stack Diameter	feet	22	22	22	22	22	22	22	22	22	22	22	22
Co-located Eq Diameter	feet	31.11	N/A	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11	31.11
Stack Height	feet	150	150	150	150	150	150	150	150	150	150	150	150
Stack Temperature	°K	424.4	417.9	411.1	405.5	419.0	406.7	404.5	417.5	423.2	415.9	410.4	411.1
Stack Flow Rate	m^3/s	770.9	756.4	597.7	473.6	741.3	565.3	432.6	698.2	705.0	649.0	511.1	406.1
Stack Exit Velocity	m/s	21.82	21.41	16.91	13.40	20.98	16.00	12.24	19.76	19.95	18.37	14.46	11.49
Stack Exit Velocity	fps	71.6	70.2	55.5	44.0	68.8	52.5	40.2	64.8	65.4	60.2	47.4	37.7
NO_x Emission Rate	g/s	6.552	5.859	5.254	4.032	6.199	4.901	3.780	5.771	5.746	5.368	4.322	3.352
CO Emission Rate	g/s	1.600	1.424	1.273	0.982	1.512	1.194	0.921	1.411	1.399	1.310	1.051	0.816
SO_2 Emission Rate	g/s	0.620	0.620	0.497	0.383	0.587	0.464	0.358	0.547	0.544	0.508	0.408	0.318
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	5.368	5.368	5.292	5.242	5.342	5.279	5.229	5.330	5.317	5.305	5.254	5.204

APPENDIX L-B: FACILITY LAYOUT DIAGRAMS AND BPIP DATA

CPV Towantic - Facility Layout Schematic Diagram



Structure Heights

Letter	Equipment	Height (feet)
A	CTG Air Inlet	72.4
B	CTG Enclosure	37
C	HRSG	97
D	Steam Drums B, C	106
E	Steam Drum A	110.3
F	EDG Enclosure	15
G	Admin/Control/Elec Building	52
H	Turbine Building	37
I	STG Enclosure	64
J	Condensate Tanks	40
K	Demineralizer Water Tank	42
L	Demineralizer Water Tank	42
M	Fire Protection Tank	40
N	Fire Protection Pump House	17.5
O	Fuel Oil Tank	48
P	Air-Cooled Condenser	85

Source Stacks

Abbreviation	Description	Distance to Fence (feet)	Coordinates	
			Latitude	Longitude
CT#1	Combustion Turbine #1	136	41° 29'01.435"	73° 07'17.908"
CT#2	Combustion Tubine #2	295	41° 29'01.133"	73° 07'17.663"
EDG	Emergency Diesel Generator	275	41° 29'01.000"	73° 07'20.822"
FP	Fire Pump Engine	188	41° 29'03.862"	73° 07'21.569"
AUX	Auxiliary Boiler	325	41° 29'02.909"	73° 07'23.396'

CPV Towantic - Summary of Building Dimensions for Significant Structures

Structure	Length (ft)	Width (ft)	Height (ft)	Diameter (ft)	Ground Elevation (ft)
Main HRSGs	120	47.8	97	NA	830
HRSG Steam Drum A	46	8.4	110.3	NA	830
HRSG Steam Drums B, C	34.2	5.8	106	NA	830
CTG Enclosure	77	35.5	37	NA	830
CTG Air Inlet	58	34	72.4	NA	830
EDG Enclosure	22	30	15	NA	830
Admin/Control/Elec Building	59	186	52	NA	830
Turbine Building	92	161	37	NA	830
STG Enclosure	44	110	64	NA	830
Fire Protection Pump House	20	30	15	NA	830
Air Cooled Condenser (ACC)	250	268	85	NA	830
Tanks:					
Condensate Tank	NA	NA	40	30	830
Demineralizer Water Tanks	NA	NA	42	60	830
Fire Protection Tanks	NA	NA	40	40	830
Fuel Oil Tanks	NA	NA	48	73	830

BPIP Input

```
'C:\Users\ted.guertin\Desktop\CPV Towantic\AERMOD9\BPIP_Schematic.BST BEESTWin BPIP-Prime Files 8/27/2014 1:54:40
PM'
'P'
'METERS'      1.0
'UTMY'        0
 23
'HRSG2'        1             252.984
 12           29.5656
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656760.98     4594178.08
656766.69     4594155.35
656768.32     4594155.74
656771.85     4594153.13
656772.43     4594154.12
656775        4594155.15
656777.25     4594154.45
656779.12     4594158.46
656780.76     4594158.87
656775.05     4594181.61
656769.05     4594190.02
'HRSG1'        1             252.984
 12           29.5656
656802.8      4594198.53
656801.45     4594188.25
656807.16     4594165.52
656808.82     4594165.9
656812.39     4594163.25
656812.91     4594164.3
656815.47     4594165.34
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656819.64     4594168.63
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'fireBldg'     1             252.984
 4            4.572
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'AIRIN1'       1             252.984
 4            22.06752
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656755.06     4594211.
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656760.29     4594231.07
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 4            22.06752
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656791.11     4594238.79
656800.81     4594241.24
'drumC2'       1             252.984
 26           32.3088
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656763.91     4594174.3
656763.92     4594174.13
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656764.76     4594173.23
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656765.39	4594168.3	
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656765.51	4594167.92	
656765.59	4594167.77	
656765.68	4594167.66	
656765.79	4594167.54	
656765.91	4594167.46	
656766.07	4594167.42	
656766.23	4594167.43	
656775.1	4594169.66	
656775.31	4594169.76	
656775.45	4594169.99	
656775.51	4594170.27	
656775.51	4594170.53	
656775.44	4594170.79	
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656774.82	4594171.44	
656774.67	4594171.43	
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23	33.61944	
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656779.17	4594161.9	
656779.37	4594162.09	
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656806.59	4594169.6	
656806.84	4594169.25	
656807.13	4594169.04	
656807.33	4594168.99	
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656820.01	4594173.29	
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656819.69	4594174.17	

656819.5	4594174.4	
656819.29	4594174.59	
656819.07	4594174.67	
656818.85	4594174.66	
'drumB1'	1	252.984
26	32.3088	
656806.28	4594179.37	
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656806.06	4594179.24	
656805.99	4594179.12	
656805.92	4594178.98	
656805.89	4594178.84	
656805.87	4594178.64	
656805.91	4594178.35	
656805.99	4594178.12	
656806.12	4594177.9	
656806.21	4594177.8	
656806.28	4594177.72	
656806.4	4594177.65	
656806.55	4594177.6	
656806.73	4594177.61	
656815.59	4594179.83	
656815.76	4594179.9	
656815.92	4594180.11	
656816.	4594180.4	
656816.01	4594180.62	
656815.93	4594180.99	
656815.85	4594181.16	
656815.75	4594181.34	
656815.52	4594181.55	
656815.29	4594181.61	
656815.16	4594181.6	
'drumC1'	1	252.984
26	32.3088	
656804.82	4594185.19	
656804.69	4594185.11	
656804.58	4594185.02	
656804.52	4594184.91	
656804.48	4594184.82	
656804.43	4594184.68	
656804.42	4594184.5	
656804.42	4594184.33	
656804.46	4594184.12	
656804.6	4594183.8	
656804.73	4594183.61	
656804.86	4594183.49	
656804.99	4594183.45	
656805.12	4594183.41	
656805.27	4594183.42	
656814.14	4594185.64	
656814.3	4594185.72	
656814.42	4594185.84	
656814.52	4594186.04	
656814.55	4594186.42	
656814.47	4594186.82	
656814.25	4594187.18	
656814.07	4594187.34	
656813.96	4594187.39	
656813.82	4594187.42	
656813.69	4594187.4	
'STG'	1	252.984
6	11.2776	
656682.42	4594214.63	
656737.4	4594228.43	
656748.58	4594183.82	
656701.07	4594171.87	
656694.25	4594199.11	
656686.81	4594197.22	
'ADMIN'	1	252.984
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656741.77	4594211.03	
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'STGENCL'	1	252.984
4	19.5072	
656702.3	4594194.05	
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656737.92	4594189.14	
656705.58	4594181.06	
'CTURB1'	1	252.984

12	11.2776	
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656770.82	4594193.26	
656768.27	4594192.6	
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656769.04	4594190.03	
656762.3	4594188.33	
656762.34	4594188.59	
656761.74	4594190.96	
656760.16	4594190.56	
656750.56	4594228.61	
656760.27	4594231.04	
656764.72	4594213.45	
'CTURB2'	1	252.984
12	11.2776	
656806.18	4594223.87	
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656808.78	4594202.78	
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656809.54	4594200.19	
656802.8	4594198.52	
656802.84	4594198.73	
656802.22	4594201.13	
656800.66	4594200.74	
656791.1	4594238.78	
656800.8	4594241.22	
656805.23	4594223.62	
'EDG'	1	252.984
4	4.572	
656728.68	4594235.67	
656730.91	4594226.8	
656737.42	4594228.44	
656735.19	4594237.3	
'demin1'	1	252.984
32	12.8016	
656720.37	4594148.57	
656720.2	4594150.35	
656719.68	4594152.06	
656718.83	4594153.65	
656717.69	4594155.03	
656716.31	4594156.17	
656714.73	4594157.01	
656713.01	4594157.53	
656711.23	4594157.71	
656709.44	4594157.53	
656707.73	4594157.01	
656706.15	4594156.17	
656704.76	4594155.03	
656703.62	4594153.65	
656702.78	4594152.06	
656702.26	4594150.35	
656702.08	4594148.57	
656702.26	4594146.78	
656702.78	4594145.07	
656703.62	4594143.49	
656704.76	4594142.1	
656706.15	4594140.96	
656707.73	4594140.12	
656709.44	4594139.6	
656711.23	4594139.42	
656713.01	4594139.6	
656714.73	4594140.12	
656716.31	4594140.96	
656717.69	4594142.1	
656718.83	4594143.49	
656719.68	4594145.07	
656720.2	4594146.78	
'demin2'	1	252.984
32	12.8016	
656725.39	4594128.4	
656725.21	4594130.18	
656724.69	4594131.9	
656723.85	4594133.48	
656722.71	4594134.86	
656721.32	4594136.	
656719.74	4594136.84	
656718.03	4594137.36	
656716.24	4594137.54	
656714.46	4594137.36	
656712.74	4594136.84	
656711.16	4594136.	

656709.78	4594134.86	
656708.64	4594133.48	
656707.8	4594131.9	
656707.28	4594130.18	
656707.1	4594128.4	
656707.28	4594126.61	
656707.8	4594124.9	
656708.64	4594123.32	
656709.78	4594121.93	
656711.16	4594120.79	
656712.74	4594119.95	
656714.46	4594119.43	
656716.24	4594119.25	
656718.03	4594119.43	
656719.74	4594119.95	
656721.32	4594120.79	
656722.71	4594121.93	
656723.85	4594123.32	
656724.69	4594124.9	
656725.21	4594126.61	
'firetank'	1	252.984
32	12.192	
656748.51	4594153.72	
656748.39	4594154.91	
656748.05	4594156.06	
656747.48	4594157.11	
656746.73	4594158.03	
656745.8	4594158.79	
656744.75	4594159.36	
656743.6	4594159.7	
656742.42	4594159.82	
656741.23	4594159.7	
656740.08	4594159.36	
656739.03	4594158.79	
656738.1	4594158.03	
656737.35	4594157.11	
656736.78	4594156.06	
656736.44	4594154.91	
656736.32	4594153.72	
656736.44	4594152.53	
656736.78	4594151.39	
656737.35	4594150.34	
656738.1	4594149.41	
656739.03	4594148.66	
656740.08	4594148.09	
656741.23	4594147.74	
656742.42	4594147.63	
656743.6	4594147.74	
656744.75	4594148.09	
656745.8	4594148.66	
656746.73	4594149.41	
656747.48	4594150.34	
656748.05	4594151.39	
656748.39	4594152.53	
'condtank'	1	252.984
32	12.192	
656742.45	4594171.8	
656742.36	4594172.69	
656742.1	4594173.55	
656741.68	4594174.34	
656741.11	4594175.03	
656740.42	4594175.6	
656739.63	4594176.02	
656738.77	4594176.28	
656737.88	4594176.37	
656736.99	4594176.28	
656736.13	4594176.02	
656735.34	4594175.6	
656734.65	4594175.03	
656734.08	4594174.34	
656733.65	4594173.55	
656733.39	4594172.69	
656733.31	4594171.8	
656733.39	4594170.91	
656733.65	4594170.05	
656734.08	4594169.26	
656734.65	4594168.57	
656735.34	4594168.	
656736.13	4594167.58	
656736.99	4594167.32	
656737.88	4594167.23	

656738.77	4594167.32				
656739.63	4594167.58				
656740.42	4594168.				
656741.11	4594168.57				
656741.68	4594169.26				
656742.1	4594170.05				
656742.36	4594170.91				
'fueloil'	1	252.984			
32	14.6304				
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656842.77	4594111.66				
656842.14	4594113.75				
656841.11	4594115.67				
656839.72	4594117.36				
656838.04	4594118.74				
656836.12	4594119.77				
656834.03	4594120.41				
656831.86	4594120.62				
656829.69	4594120.41				
656827.6	4594119.77				
656825.68	4594118.74				
656823.99	4594117.36				
656822.61	4594115.67				
656821.58	4594113.75				
656820.95	4594111.66				
656820.73	4594109.49				
656820.95	4594107.32				
656821.58	4594105.24				
656822.61	4594103.31				
656823.99	4594101.63				
656825.68	4594100.24				
656827.6	4594099.22				
656829.69	4594098.58				
656831.86	4594098.37				
656834.03	4594098.58				
656836.12	4594099.22				
656838.04	4594100.24				
656839.72	4594101.63				
656841.11	4594103.31				
656842.14	4594105.24				
656842.77	4594107.32				
5					
'FIREPUMP	'	252.984	5.334	656748.5	4594146.3
'EGEN	'	252.984	4.4196	656729.2	4594234.2
'CT1_#53	'	252.984	45.72	656815.8	4594161.2
'CT2_#53	'	252.984	45.72	656775.3	4594151.
'AUXBLR	'	252.984	18.8976	656687.5	4594203.9

BPIP Output

```
SO BUILDHGT FIREPUMP      25.91    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT FIREPUMP      29.57    29.57    29.57    29.57    29.57    25.91
SO BUILDHGT FIREPUMP      25.91    25.91    25.91    25.91    25.91    25.91
SO BUILDHGT FIREPUMP      25.91    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT FIREPUMP      29.57    29.57    29.57    29.57    29.57    25.91
SO BUILDHGT FIREPUMP      25.91    25.91    25.91    25.91    25.91    25.91
SO BUILDWID FIREPUMP     105.73    61.98    30.72    33.23    35.56    36.82
SO BUILDWID FIREPUMP      36.95    36.82    36.89    35.84    33.71   111.37
SO BUILDWID FIREPUMP     110.65   106.57    99.25    88.92    87.02    97.86
SO BUILDWID FIREPUMP     105.73    61.98    30.72    33.23    35.56    36.82
SO BUILDWID FIREPUMP      36.95    36.82    36.89    35.84    33.71   111.37
SO BUILDWID FIREPUMP     110.65   106.57    99.25    88.92    87.02    97.86
SO BUILDLEN FIREPUMP     102.74    57.11    31.21    28.08    24.09    20.37
SO BUILDLEN FIREPUMP      16.84    16.14    19.78    23.30    27.42   111.68
SO BUILDLEN FIREPUMP     109.59   104.16    95.57    84.08    81.71    93.65
SO BUILDLEN FIREPUMP     102.74    57.11    31.21    28.08    24.09    20.37
SO BUILDLEN FIREPUMP      16.84    16.14    19.78    23.30    27.42   111.68
SO BUILDLEN FIREPUMP     109.59   104.16    95.57    84.08    81.71    93.65
SO XBADJ    FIREPUMP    -129.37    14.40    16.93    18.63    19.75    20.28
SO XBADJ    FIREPUMP      20.19    17.81    12.48     6.29    -1.41    -7.14
SO XBADJ    FIREPUMP       4.48    15.97    26.97    37.16    40.48    34.07
SO XBADJ    FIREPUMP      26.63   -71.52   -48.14   -46.70   -43.84   -40.65
SO XBADJ    FIREPUMP     -37.03   -33.95   -32.26   -29.59   -26.02  -104.54
SO XBADJ    FIREPUMP    -114.07  -120.13  -122.55  -121.24  -122.19  -127.72
SO YBADJ    FIREPUMP     -23.47   -29.58    -6.29    -0.17     5.54    11.09
SO YBADJ    FIREPUMP      16.30    21.08    25.28    28.70    31.26   -65.25
SO YBADJ    FIREPUMP     -55.79   -44.63   -32.12   -18.63    -4.58     9.59
SO YBADJ    FIREPUMP      23.47    29.58     6.29     0.17    -5.54   -11.09
SO YBADJ    FIREPUMP     -16.30   -21.08   -25.28   -28.70   -31.26    65.25
SO YBADJ    FIREPUMP      55.79    44.63    32.12    18.63     4.58    -9.59
SO BUILDHGT EGEN          19.51    19.51    19.51    19.51    15.85    15.85
SO BUILDHGT EGEN          15.85    22.07    22.07    22.07    29.57    29.57
SO BUILDHGT EGEN          29.57    22.07    15.85    19.51    19.51    19.51
SO BUILDHGT EGEN          19.51    19.51    19.51    19.51    15.85    15.85
SO BUILDHGT EGEN          15.85    22.07    22.07    22.07    29.57    29.57
SO BUILDHGT EGEN          29.57    29.57    29.57    29.57    19.51    19.51
SO BUILDWID EGEN          35.93    35.15    33.30    30.44    40.90    32.78
SO BUILDWID EGEN          23.67    18.86    20.07    20.67    57.11    60.26
SO BUILDWID EGEN          61.89    16.91    59.43    34.59    34.23    35.62
SO BUILDWID EGEN          35.93    35.15    33.30    30.44    40.90    32.78
SO BUILDWID EGEN          23.67    18.86    20.07    20.67    33.74    31.22
SO BUILDWID EGEN          61.89    24.09    20.37    16.84    34.23    35.62
SO BUILDLEN EGEN          25.84    29.79    32.84    34.89    58.84    59.43
SO BUILDLEN EGEN          58.22    11.26    14.11    16.53    61.98    60.69
SO BUILDLEN EGEN          57.70    20.68    32.78    16.80    15.72    21.10
SO BUILDLEN EGEN          25.84    29.79    32.84    34.89    58.84    59.43
SO BUILDLEN EGEN          58.22    11.26    14.11    16.53    27.41    30.71
SO BUILDLEN EGEN          57.70    35.56    36.82    36.95    15.72    21.10
SO XBADJ    EGEN         -56.43   -58.01   -57.83   -55.89   -56.27   -55.22
SO XBADJ    EGEN         -52.50    20.12    21.42    22.07    46.79    51.60
SO XBADJ    EGEN          54.84    18.06    -6.43    28.53    32.51    32.04
SO XBADJ    EGEN          30.60    28.22    24.99    21.00    -2.57    -4.21
SO XBADJ    EGEN          -5.72   -31.39   -35.53   -38.59  -108.78  -112.29
SO XBADJ    EGEN        -112.54   -91.98   -93.09   -91.37   -48.23   -53.14
SO YBADJ    EGEN           1.55    -6.03   -13.43   -20.42    -5.38    -9.96
SO YBADJ    EGEN         -14.24   -17.91   -13.16    -8.02   -33.04   -19.41
SO YBADJ    EGEN          -5.36    13.35   -25.51   -23.08   -16.35    -9.09
SO YBADJ    EGEN          -1.55     6.03    13.43    20.42     5.38     9.96
SO YBADJ    EGEN          14.24    17.91    13.16     8.02    21.35     4.89
SO YBADJ    EGEN           5.36     9.92    -3.23   -16.68    16.35     9.09
SO BUILDHGT CT1_#53       25.91    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT CT1_#53       29.57    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT CT1_#53       29.57    29.57    29.57    29.57    33.62    25.91
SO BUILDHGT CT1_#53       29.57    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT CT1_#53       29.57    29.57    29.57    29.57    29.57    29.57
SO BUILDHGT CT1_#53       29.57    29.57    29.57    29.57    33.62    25.91
SO BUILDWID CT1_#53      105.73    61.98    30.71    33.23    35.57    36.82
SO BUILDWID CT1_#53       36.95    36.82    36.89    35.84    33.71    31.21
SO BUILDWID CT1_#53       61.89    24.11    20.41    16.88    13.97    97.86
SO BUILDWID CT1_#53       23.28    61.98    30.71    33.23    35.57    36.82
SO BUILDWID CT1_#53       36.95    36.82    36.89    35.84    33.71    31.21
SO BUILDWID CT1_#53       61.89    24.11    20.41    16.88    13.97    97.86
SO BUILDLEN CT1_#53      102.74    57.11    31.22    28.09    24.11    20.37
SO BUILDLEN CT1_#53       16.84    16.14    19.78    23.30    27.42    30.72
SO BUILDLEN CT1_#53       57.70    35.57    36.83    36.97     3.62    93.65
SO BUILDLEN CT1_#53       35.88    57.11    31.22    28.09    24.11    20.37
SO BUILDLEN CT1_#53       16.84    16.14    19.78    23.30    27.42    30.72
SO BUILDLEN CT1_#53       57.70    35.57    36.83    36.97     3.62    93.65
SO XBADJ    CT1_#53     -155.73   -22.62    -0.58    -2.24    -3.84   -45.46
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APPENDIX L-C: DETAILED AERMOD RESULTS SUMMARY

CPV Towantic Energy, LLC - 7HA01 Combustion Turbine Emissions Data For Modeling

Parameter	Units	GE Design Cases																		
		#1	#2	#3	#4	#28	#29	#35	#9	#31	#32	#11	#36	#13	#14	#16	#17	#23	#24	#22
Fuel	N/A	Natural Gas																		
NO_x Emission Rate	g/s	2.633	2.533	3.377	2.444	1.953	1.512	2.495	2.318	1.827	1.399	1.058	2.318	2.192	2.369	2.936	2.192	1.613	1.246	1.115
CO Emission Rate	g/s	1.361	1.310	1.739	0.669	0.534	0.413	1.251	0.634	0.501	0.383	0.290	1.197	0.602	1.229	1.512	0.600	0.440	0.341	0.305
SO_2 Emission Rate	g/s	0.611	0.588	0.782	0.565	0.458	0.354	0.585	0.543	0.431	0.328	0.249	0.543	0.516	0.556	0.686	0.514	0.378	0.293	0.262
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	2.520	2.457	2.570	1.226	1.158	1.104	2.558	1.215	1.144	1.090	1.050	2.407	1.201	2.533	2.268	1.200	1.116	1.072	1.056

AERMOD Impacts 5 years, 1 or 2 Turbines unit (1 or 2 g/s) emissions, ug/m3 - (GE 7H) 150 ft separate stacks Updated for final site configuration 8-20-14 (TR)

Worst Case over range of years 2008-2012

Annual (max)	0.05066	0.04823	0.02684	0.04584	0.06059	0.08489	0.0579	0.0543	0.06822	0.08872	0.13981	0.05748	0.05226	0.05186	0.03059	0.0502	0.06516	0.09056	0.11457
1-hour	6.5498	6.50293	4.1037	6.41783	7.28093	7.94908	6.91786	6.8286	7.51179	8.00134	9.80406	7.10237	6.90103	6.89171	4.3138	6.86162	7.58315	8.10924	8.71551
3-hour	2.76245	2.68733	1.54833	2.59023	3.85117	4.94601	3.3054	3.21334	4.2387	5.06142	8.02324	3.54274	3.27144	3.26043	1.8276	3.19513	4.29116	5.22557	6.85123
8-hour	1.73652	1.67545	1.0506	1.61473	2.26178	3.81726	1.98492	1.8898	2.69513	4.03771	6.4954	2.04671	1.87147	1.85966	1.3004	1.81048	2.69384	4.30997	5.55727
24-hour - H1H	0.65878	0.61316	0.45169	0.5689	1.02429	1.73011	0.86347	0.79463	1.25453	1.82628	3.31078	0.92398	0.7792	0.76906	0.58705	0.73643	1.22636	1.91797	2.62758
24-hour - H2H	0.60629	0.57725	0.33763	0.55498	0.80913	1.40654	0.71984	0.67807	0.96614	1.49118	2.67171	0.74186	0.6684	0.66362	0.42904	0.64067	0.95475	1.58713	2.16161

AERMOD Scaled Pollutant Impacts 1 or 2 Turbines, ug/m3 - GE 7H 150ft Separate Stacks Updated for final site configuration 8-20-14 (TR)

NO2	Annual	0.13	0.12	0.09	0.11	0.12	0.13	0.14	0.13	0.12	0.12	0.15	0.13	0.11	0.12	0.09	0.11	0.11	0.11	0.13
	1-hr	17.25	16.47	13.86	15.69	14.22	12.02	17.26	15.83	13.72	11.19	10.38	16.47	15.13	16.33	12.66	15.04	12.23	10.11	9.72
CO	1-hr	8.91	8.52	7.14	4.29	3.89	3.29	8.66	4.33	3.77	3.06	2.84	8.50	4.16	8.47	6.52	4.12	3.33	2.77	2.66
	8-hr	2.36	2.20	1.83	1.08	1.21	1.58	2.48	1.20	1.35	1.55	1.88	2.45	1.13	2.28	1.97	1.09	1.18	1.47	1.69
SO2	Annual	0.0309	0.0284	0.0210	0.0259	0.0278	0.0300	0.0339	0.0295	0.0294	0.0291	0.0349	0.0312	0.0269	0.0289	0.0210	0.0258	0.0246	0.0266	0.0300
	1-hr	4.00	3.82	3.21	3.63	3.34	2.81	4.05	3.71	3.24	2.63	2.45	3.86	3.56	3.83	2.96	3.53	2.87	2.38	2.28
	3-hr	1.69	1.58	1.21	1.46	1.76	1.75	1.93	1.74	1.83	1.66	2.00	1.92	1.69	1.81	1.25	1.64	1.62	1.53	1.79
	24-hr	0.40	0.36	0.35	0.32	0.47	0.61	0.51	0.43	0.54	0.60	0.83	0.50	0.40	0.43	0.40	0.38	0.46	0.56	0.69
PM	Annual	0.13	0.12	0.07	0.06	0.07	0.09	0.15	0.07	0.08	0.10	0.15	0.14	0.06	0.13	0.07	0.06	0.07	0.10	0.12
	24-hr H1H	1.66	1.51	1.16	0.70	1.19	1.91	2.21	0.97	1.44	1.99	3.47	2.22	0.94	1.95	1.33	0.88	1.37	2.06	2.77
	24-hr H2H	1.53	1.42	0.87	0.68	0.94	1.55	1.84	0.82	1.11	1.63	2.80	1.79	0.80	1.68	0.97	0.77	1.07	1.70	2.28
PM	Annual (5yrAv)	0.091	0.084	0.049	0.040	0.052	0.078	0.106	0.047	0.060	0.081	0.130	0.099	0.045	0.094	0.053	0.043	0.057	0.081	0.105
	24-hr (H1H 5yrAv)	1.200	1.110	0.744	0.524	0.826	1.453	1.518	0.663	1.018	1.522	2.551	1.537	0.652	1.365	0.905	0.623	0.981	1.577	2.093
	24-hr (H8H 5yrAv)	0.632	0.586	0.357	0.277	0.374	0.558	0.746	0.329	0.429	0.579	1.017	0.726	0.319	0.667	0.386	0.301	0.413	0.587	0.802
NO2	1-hr (H1H 5yrAv)	6.600	6.193	5.587	5.748	7.008	8.493	7.653	6.760	8.072	8.125	8.903	7.360	6.451	6.807	6.470	6.200	7.313	7.391	8.127
	1-hr (H8H 5yrAv)	3.361	3.101	2.336	2.848	3.032	3.866	3.578	3.154	3.398	3.867	5.556	3.310	2.883	3.095	2.598	2.781	2.943	3.643	4.703

CPV Towantic Energy, LLC - 7HA01 Combustion Turbine Emissions Data For Modeling

Parameter	Units	GE Design Cases											
		#37	#46	#47	#38	#41	#52	#53	#42	#43	#44	#51	#45
Fuel	N/A	Distillate Oil											
NO_x Emission Rate	g/s	6.552	5.859	5.254	4.032	6.199	4.901	3.780	5.771	5.746	5.368	4.322	3.352
CO Emission Rate	g/s	1.600	1.424	1.273	0.982	1.512	1.194	0.921	1.411	1.399	1.310	1.051	0.816
SO_2 Emission Rate	g/s	0.620	0.620	0.497	0.383	0.587	0.464	0.358	0.547	0.544	0.508	0.408	0.318
$PM_{10}/PM_{2.5}$ Emission Rate	g/s	5.368	5.368	5.292	5.242	5.342	5.279	5.229	5.330	5.317	5.305	5.254	5.204

AERMOD Impacts 5 years, 1 or 2 Turbines unit (1 or 2 g/s) emissions, ug/m3 - (GE 7H) 150 ft separate stacks
Worst Case over range of years 2008-2012

Annual (max)	0.02674	0.01389	0.03727	0.04898	0.02858	0.04042	0.05417	0.0306	0.02952	0.0333	0.04411	0.05596
1-hour	5.53318	3.70456	6.64745	7.41359	5.71663	6.84434	7.64872	5.99823	5.91216	6.27664	7.17392	7.78879
3-hour	1.86528	1.28083	2.75688	3.82199	1.93199	3.05084	4.1662	2.03443	2.00288	2.33507	3.5249	4.34251
8-hour	0.96586	0.49385	1.45057	1.97352	1.06318	1.5745	2.41459	1.1726	1.14374	1.2875	1.7569	2.67515
24-hour - H1H	0.32325	0.1649	0.49372	0.87528	0.35584	0.57393	1.07071	0.39389	0.38351	0.4342	0.70156	1.16371
24-hour - H2H	0.25124	0.13899	0.441	0.69882	0.27616	0.51592	0.8193	0.30025	0.27514	0.34318	0.61345	0.91896

AERMOD Scaled Pollutant Impacts 1 or 2 Turbines, ug/m3 - GE 7H 150ft Separate Stacks

NO2	Annual	0.18	0.08	0.20	0.197	0.18	0.198	0.205	0.18	0.170	0.179	0.191	0.188
	1-hr	36.25	21.71	34.93	29.89	35.44	33.55	28.91	34.61	33.97	33.69	31.00	26.10
CO	1-hr	8.85	5.27	8.46	7.28	8.64	8.18	7.04	8.46	8.27	8.22	7.54	6.36
	8-hr	1.55	0.70	1.85	1.94	1.61	1.88	2.22	1.65	1.60	1.69	1.85	2.18
SO2	Annual	0.0166	0.0086	0.0185	0.0187	0.0168	0.0188	0.0194	0.0167	0.0161	0.0169	0.0180	0.0178
	1-hr	3.43	2.30	3.3068	2.8360	3.3537	3.1770	2.74	3.28	3.22	3.19	2.93	2.47
	3-hr	1.16	0.79	1.37	1.46	1.13	1.42	1.49	1.11	1.09	1.19	1.44	1.38
	24-hr	0.20	0.10	0.25	0.3348	0.2088	0.2664	0.3837	0.22	0.21	0.22	0.29	0.37
PM	Annual	0.14	0.07	0.20	0.26	0.15	0.21	0.283	0.16	0.16	0.18	0.23	0.291
	24-hr H1H	1.74	0.89	2.61	4.59	1.90	3.03	5.60	2.10	2.04	2.30	3.69	6.06
	24-hr H2H	1.35	0.75	2.33	3.66	1.48	2.72	4.28	1.60	1.46	1.82	3.22	4.78
PM	Annual (5yrAv)	0.097	0.050	0.137	0.188	0.104	0.150	0.217	0.112	0.107	0.120	0.166	0.229
	24-hr (H1H 5yrAv)	1.177	0.709	1.960	3.062	1.290	2.243	3.803	1.421	1.351	1.863	2.432	4.210
	24-hr (H8H 5yrAv)	0.691	0.358	0.957	1.376	0.736	1.045	1.580	0.789	0.756	0.843	1.156	1.672
NO2	1-hr (H1H 5yrAv)	10.590	5.743	11.618	14.509	10.443	11.634	15.285	10.240	9.990	9.680	12.610	14.739
	1-hr (H8H 5yrAv)	4.567	2.062	5.033	5.162	4.580	5.085	5.641	4.549	4.370	4.359	4.851	5.363

CPV Towantic Energy Center - Detailed Results table

Pollutant	Averaging Period	Rank for SIL Assessment	Max Impact (µg/m^3)	Max Impact Receptor Location		Max Impact Date (YRMODYHR)	Elevation (m)	Worst Case Turbine Load	SIL (µg/m^3)	NAAQS (µg/m^3)	PSD Class II Increment (µg/m^3)
				UTM-E (m)	UTM-N (m)						
NO2	1-hour	H1H (5-year Average)	12.91	656680.7	4594393	5-year average	261.59	2 O Start	7.5	188	NA
	Annual	H1H	1.390	656859.5	4594221.4	2008	250.7	53	1	100	25
CO	1-hour	H1H	301.945	656900	4594450	09120307	256.63	2 G Start	2000	40000	NA
	8-hour	H1H	176.262	657050	4593950	09022308	212.65	2 G Start	500	10000	NA
PM10	24-hour	H1H	4.24	656852	4594245.9	11110324	252.27	45	5	150	30
	Annual	H1H	0.29	657100	4594350	2012	271.26	45	1	NA	17
PM2.5 (NAAQS)	24-hour	H1H (5-year Average)	3.47	656852	4594245.9	5-year average	252.27	45	1.2	35	NA
	Annual	H1H (5-year Average)	0.21	657200	4594350	5-year average	255.63	45	0.3	12	NA
PM2.5 (PSD)	24-hour	H1H	4.24	656852	4594245.9	11110324	252.27	45	1.2	NA	9
	Annual	H1H	0.29	657100	4594350	2012	271.26	45	0.3	NA	4
SO2	1-hour	H1H (5-year Average)	2.67	656950	4594500	5-year average	259.91	2 G Start	7.8	196	NA
	3-hour	H1H	1.36	657050	4593950	11021503	212.65	11	25	1300	512
	24-hour	H1H	0.49	657150	4593900	09022324	217.68	11	5	365	91
	Annual	H1H	0.03	657150	4594350	2012	265.35	35	1	80	20

CPV Towantic Energy Center - Cumulative Impacts

Pollutant	Averaging Period	Rank for SIL Assessment	Cumulative Impact (µg/m^3)	Project Impact	Ambient Background (µg/m^3)	Total Impact w/ Background (µg/m^3)	Max Impact Receptor Location		Max Impact Date (YRMODYHR)	Elevation (m)	NAAQS (µg/m^3)	PSD Class II Increment (µg/m^3)
							UTM-E (m)	UTM-N (m)				
NO2 (NAAQS)	1-hour	H1H (5-year Average)	81.81	12.03	87.00	168.81	656708.9	4594416.4	5-year average	263.46	188.00	NA
	Annual	H1H	1.87	1.39	21.00	22.87	656950	4594400	2011	256.46	100.00	NA
NO2 (PSD)	Annual	H1H	2.38	1.39	NA	2.38	657000	4594400	2008	264.45	NA	25
PM2.5 (NAAQS)	24-hour	H1H (5-year Average)	3.47	3.47	24.00	27.47	656852	4594245.9	5-year average	252.27	35.00	NA
PM2.5 (PSD)	24-hour	H1H	4.24	4.24	NA	4.24	656852	4594245.9	11110324	252.27	NA	9

Note: Cumulative impacts reported for all pollutants and averaging periods for which the project has a significant impact.

APPENDIX L-D: BACKGROUND INVENTORY SOURCE DATA

Towantic Energy Center – Background Source Inventory for Cumulative Modeling Assessment

As described Section 3.11, the proposed Project has significant predicted impact concentrations for 1-hour NO_2, 24-hour $PM_{2.5}$, and 24-hour PM_{10}. Therefore, cumulative modeling with other regional sources has been conducted. The source inventory was based on the DEEP Radius Search Tool for 2008 Air Emissions Inventory Data, provided by DEEP. The Radius Search Tool was used to determine the potential inventory of sources located within 50 km of the project. DEEP guidance, based on distance and actual annual emissions levels, was used to determine the final set of inventory sources for the cumulative modeling assessment. The CTDEEP guidance criteria for background source selection is summarized below:

- For NAAQS modeling:
  - All stacks with actual emissions of > 15 tons per year (TPY) of a given pollutant that fall within the radius of significance of the subject source for that pollutant;
  - All stacks with actual emissions of ≥ 50 TPY that fall within 20 km of the subject source; and
  - All stacks with actual emissions of ≥ 500 TPY that fall within 50 km of the subject source.

All sources retrieved above should be modeled at their allowable emission rate for all short term averaging times. Sources can be modeled at their actual emission rates for annual average modeling.

- For PSD increment tracking:
  - All sources affecting PSD increment (defined in RCSA sections 22a-174-3a(k)(5) and 22a-174-3a(k)(6)) that fall within the radius of significance of the subject source for the applicable pollutant;
  - All sources affecting PSD increment with actual stack emissions of ≥ 50 TPY that fall within 20 km of the subject source; and
  - All sources affecting PSD increment with actual stack emissions of ≥ 500 TPY that fall within 50 km of the subject source.

Only one NO_X source met the CTDEEP criteria for inclusion in the cumulative NO2 NAAQS analysis. Three (3) additional sources met the criteria for the annual NO2 PSD increment analysis. No inventory sources of PM met the criteria for inclusion in the cumulative modeling assessment for PM_{10}/$PM_{2.5}$ NAAQS compliance. However, three (3) sources did meet the criteria for the PSD PM_{10} increment analysis. Note that there is no increment for 1-hour NO_2, and that the baseline date has not yet been triggered for $PM_{2.5}$, but will be with the Project. The background sources modeled cumulatively with the project are:

<u>NO_x Sources:</u>

- Bridgeport Harbor Generating Station, Bridgeport, Connecticut
  - Generator #3 – Actual NO_x = 2,111.9 tpy, Distance from Project = 35.2 km (NAAQS and PSD)
- Algonquin Gas Transmission, Oxford, Connecticut
  - Turbine #1 – Actual NO_x = 1.1 tpy, Distance from Project = 0.112 km (PSD only)
  - Turbine #2 – Actual NO_x = 0.3 tpy, Distance from Project = 0.112 km (PSD only)

- Turbine #3 – Actual NO_x = 0.2 tpy, Distance from Project = 0.112 km (PSD only)

PM_{10} Sources:

- Algonquin Gas Transmission, Oxford, Connecticut
  - Turbine #1 – Actual NO_x = 0.1 tpy, Distance from Project = 0.112 km (PSD only)
  - Turbine #2 – Actual NO_x = 0.0 tpy, Distance from Project = 0.112 km (PSD only)
  - Turbine #3 – Actual NO_x = 0.0 tpy, Distance from Project = 0.112 km (PSD only)

Modeled Source Paramters for the Background Inventory Sources - Oxford, CT

Facility	Source ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter	PM10	NOx
		(m)	(m)	(m)	(m)	(K)	(m/s)	(m)	(g/s)	(g/s)
Bridgeport Harbor Station	Generator #3	652300	4559199	3.048	151.7904	416.48	38.775341	4.2672	NA	358.3
Algonquin Compressor Station, Oxford, CT	Turbine 1	656921	4594340.8	251.46	11.5824	757.04	25.812827	2.1336	0.0978	0.469
	Turbine 2	656957.1	4594351.1	251.46	11.5824	757.04	25.812827	2.1336	0.0978	0.469
	Turbine 3	656935.2	4594349.5	251.46	12.192	780.93	46.4499653	1.1582	0.0978	0.469

Note: Location coordinates and base elevations provided in the CTDEEP for Algonquin Compressor Station sources were incorrect and are corrected here.

CTDEEP Radius Search Tool Results for the Towantic Energy Center

(Selected Sources Only - full report provided with electronic modeling files)

Facility Name	Facility Town	Facility Street	Description	Startup Date	Permit Issue Date	Stack Number	Stack Height	Stack Diameter	Stack Temp	Stack Flow	Stack Elevation	Source UTMx	Source UTMy	UTM_ Zone	Distance from Centroid	Allowable NOx	Actual NOx	Allowable PM10	Actual PM10
ALGONQUIN GAS TRANSMISSION LLC	OXFORD	40 WOODRUFF	SOLAR MARS 100-	10/1/2008	12/27/2006	1	38	7	903	195550	200	656.80003	4594.2988	18	0.144	16.3	1.1	3.4	0.1
ALGONQUIN GAS TRANSMISSION LLC	OXFORD	40 WOODRUFF	SOLAR MARS 100-	10/1/2008	12/27/2006	1	38	7	903	195550	200	656.80003	4594.2988	18	0.144	16.3	0.3	3.4	0
ALGONQUIN GAS TRANSMISSION LLC	OXFORD	40 WOODRUFF	SOLAR TAURUS 60-	10/1/2008	12/27/2006	3	40	3.8	946	103700	200	656.80003	4594.2988	18	0.144	16.3	0.2	3.4	0
PSEG PWR CT LLC/BPT HARBOR STA	BRIDGEPORT	1 ATLANTIC ST	C.E. STEAM	8/1/1968	5/10/1985	3	498	14	290	1E+06	10	652.30003	4559.199	18	35.244	12456.7	2111.9	0	32.1

APPENDIX L-E: VISCREEN ANALYSIS

```
                 Visual Effects Screening Analysis for
                   Source: Towantic Energy Center
                   Class I Area: Lye Brook NWA

                   ***   Level-1 Screening   ***
Input Emissions for

   Particulates    85.20  LB /HR
   NOx (as NO2)   104.00  LB /HR
   Primary NO2      0.00  LB /HR
   Soot             0.00  LB /HR
   Primary SO4      0.00  LB /HR


    **** Default Particle Characteristics Assumed

             Transport Scenario Specifications:

    Background Ozone:                 0.04 ppm
    Background Visual Range:         40.00 km
    Source-Observer Distance:       175.00 km
    Min. Source-Class I Distance:   175.00 km
    Max. Source-Class I Distance:   185.00 km
    Plume-Source-Observer Angle:     11.25 degrees
    Stability:   6
    Wind Speed:   1.00 m/s

                          R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

         Maximum Visual Impacts INSIDE  Class I Area
          Screening Criteria ARE NOT Exceeded
                                     Delta E       Contrast
                                   ===========   ============
Backgrnd Theta Azi Distance Alpha Crit  Plume   Crit  Plume
======== ===== === ======== ===== ====  =====   ====  =====
 SKY       10.  84.  175.0    84.  2.00  0.032   0.05  0.000
 SKY      140.  84.  175.0    84.  2.00  0.005   0.05  0.000
 TERRAIN   10.  84.  175.0    84.  2.00  0.002   0.05  0.000
 TERRAIN  140.  84.  175.0    84.  2.00  0.001   0.05  0.000


         Maximum Visual Impacts OUTSIDE Class I Area
          Screening Criteria ARE NOT Exceeded
                                     Delta E       Contrast
                                   ===========   ============
Backgrnd Theta Azi Distance Alpha Crit  Plume   Crit  Plume
======== ===== === ======== ===== ====  =====   ====  =====
 SKY       10.  70.  166.4    99.  2.00  0.034   0.05  0.000
 SKY      140.  70.  166.4    99.  2.00  0.005   0.05  0.000
 TERRAIN   10.  65.  163.3   104.  2.00  0.003   0.05  0.000
 TERRAIN  140.  65.  163.3   104.  2.00  0.001   0.05  0.000
```

APPENDIX L-F: DETAILED CALCULATIONS FOR IMPACTS TO SOILS AND VEGETATION

Towantic - Soils and Vegetation Impacts

								Screening Conc for Exposure			
Trace Element	**Annual Conc (ug/m3)**	**Deposited Conc (ppmw)**	**Avg. Soil Conc (ppmw)**	**Percent Increase**	**Soil Concentration Ratio**	**Tissue Conc**		**Soil**	**Percent of Soil Conc**	**Tissue**	**Percent of Tissue Conc**
Arsenic	2.93E-05	8.39E-03	6	0.14	0.14	1.17E-03		3	0.3%	0.25	0.5%
Beryllium	3.70E-06	1.06E-03	6	0.02	NA	NA		NA	NA	NA	NA
Boron	NA	NA	10		5.3	NA		0.5	NA	11	NA
Cadmium	1.08E-04	3.10E-02	0.06	51.66	10.7	3.32E-01		2.5	1.2%	3	11.1%
Chromium	2.20E-04	6.32E-02	100	0.06	0.02	1.26E-03		8.4	0.8%	1	0.1%
Cobalt	6.06E-06	1.74E-03	8	0.02	0.11	1.91E-04		NA	NA	19	0.0%
Copper	NA	NA	20	NA	0.47	NA		40	NA	0.73	NA
Fluoride	NA	NA	200	NA	0.03	NA		400	NA	310	NA
Lead	1.66E-04	4.77E-02	10	0.48	0.45	2.15E-02		1000	0.0%	126	0.0%
Manganese	7.75E-03	2.22E+00	850	0.26	0.066	1.47E-01		2.5	88.8%	400	0.0%
Mercury	2.57E-05	7.36E-03	0.1	7.36	0.5	3.68E-03		455	0.0%	NA	NA
Nickel	1.66E-04	4.76E-02	40	0.12	0.045	2.14E-03		500	0.0%	60	0.0%
Selenium	2.47E-04	7.07E-02	0.5	14.14	1	7.07E-02		13	0.5%	100	0.1%
Vanadium	NA	NA	100	NA	0.01	NA		2.5	NA	NA	NA
Zinc	NA	NA	50	NA	0.64	NA		NA	NA	300	NA

ATTACHMENT M – APPLICANT COMPLIANCE INFORMATION

Provided on the following pages is a completed Applicant Compliance Information form (DEEP-APP-002).

Connecticut Department of
Energy & Environmental Protection

Applicant Compliance Information

DEEP ONLY
App. No. ___________________________
Co./Ind. No. _________________________

Applicant Name: CPV Towantic, LLC

Mailing Address: **50 Braintree Hill Office Park, Suite 300**

City/Town: **Braintree** State: **MA** Zip Code: **02184**

Business Phone: **781-848-3611** ext.:

Contact Person: **Andrew Bazinet** Phone: **781-848-3611** ext.

*E-mail: **abazinet@cpv.com**

If you answer *yes* to any of the questions below, you must complete the Table of Enforcement Actions on the reverse side of this sheet as directed in the instructions for your permit application.

A. During the five years immediately preceding submission of this application, has the applicant been convicted in any jurisdiction of a criminal violation of any environmental law?

☐ Yes ☒ No

B. During the five years immediately preceding submission of this application, has a civil penalty been imposed upon the applicant in any state, including Connecticut, or federal judicial proceeding for any violation of an environmental law?

☐ Yes ☒ No

C. During the five years immediately preceding submission of this application, has a civil penalty exceeding five thousand dollars been imposed on the applicant in any state, including Connecticut, or federal administrative proceeding for any violation of an environmental law?

☐ Yes ☒ No

D. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal court issued any order or entered any judgement to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

E. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal administrative agency issued any order to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

Table of Enforcement Actions

(1) Type of Action	(2a) Date Commenced	(2b) Date Terminated	(3) Jurisdiction	(4) Case/Docket/ Order No.	(5) Description of Violation

☐ Check the box if additional sheets are attached. Copies of this form may be duplicated for additional space.

ATTACHMENT N – MARKED UP PERMIT

Provided on the following pages is a completed markup of Town-Permit Number 144-0011 issued to Towantic Energy LLC on December 7, 2004 and later modified on June 1, 2010. Proposed modifications consistent with the current application are provided.

STATE OF CONNECTICUT
DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

NEW SOURCE REVIEW PERMIT
TO CONSTRUCT AND OPERATE
A STATIONARY SOURCE

Issued pursuant to Title 22a of the Connecticut General Statutes (CGS) and Section 22a-174-3a of the Regulations of Connecticut State Agencies (RCSA). (The regulatory citations identified in the prior permit have not been verified for accuracy with current versions of the regulations for this permit markup)

Owner/Operator:	CPV Towantic ~~Energy~~, LLC
Address:	~~c/o GE Energy Financial Services, Inc., 800 Long~~50 Braintree Hill Office Park, Suite 300 ~~Ridge Road, Stamford, CT~~ Braintree, MA 02184
Equipment Location:	Woodruff Hill Road, Oxford, CT

Equipment Description: General Electric ~~PG7241FA~~7HA.01 combustion turbine with DLN combustor

Town-Permit Numbers:	144-0011
Town-Premises Numbers:	144-014
Permit Issue Date:	~~12/07/04~~
Modification Issue Date:	~~JUN 0 1 2010~~
Expiration Date:	NONE

Amey Marrella
Commissioner

June 1, 2010
Date

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

This permit specifies necessary terms and conditions for the operation of this equipment to comply with state and federal air quality standards. The Permittee shall at all times comply with the terms and conditions stated herein.

PART I. DESIGN SPECIFICATIONS

A. General Description

CPV Towantic~~ Energy~~, LLC operates a power generation facility consisting of two (2) General Electric ~~PG7241FA (GE7FA)~~7HA.01 combustion turbines with ~~acombineda~~a combined nominal gross output of ~~550~~805 MW in Oxford, CT. The two turbines are dual fuel fired combined cycle units with heat recovery steam generators (HRSGs) to power a single steam turbine generator. Supplemental firing (Duct Firing) of the HRSGs with natural gas is conducted during periods of peak demand.

B. Equipment Design Specifications

1. Turbine
   a. Maximum Fuel Firing Rate(s): ~~1,710,160~~2,457,534 ft^3/hr (gas); ~~13,921~~18,290 gallons/hr (oil)
   b. Maximum Gross Heat Input (MMBTU/hr): ~~1,748~~2,526 (gas); ~~1,942~~2,524 (oil)

2. Duct Firing
   a. Maximum Fuel Firing Rate(s): 935,895 ft^3/hr (gas);
   b. Maximum Gross Heat Input (MMBTU/hr): 962

C. Control Equipment Design Specifications

1. Water Injection: NOx inlet concentration to SCR unit ≤42 ppmvd @ 15% O_2 (only when burning distillate oil)

2. Low NOx Burner: NOx inlet concentration to SCR unit ≤9 ppmvd @ 15% O_2 (only when burning natural gas)

   a. Make and Model: TBD

3. Selective Catalytic Reduction (SCR): NOx emission to atmosphere ≤2 ppmvd@ 15% O_2 when burning gas and ≤5.~~9~~0 ppmvd @ 15% O_2 when burning distillate oil
   a. Make and Model: TBD
   b. Catalyst Type: TBD

4. Oxidation Catalyst: CO emissions to atmosphere ≤0.9~~≤2~~ ppmvd @ 15% O_2 ~~for all fuels burned~~ on gas without Duct Firing, ≤1.7 ppmvd @ 15% O_2 on gas with Duct Firing and ≤2.0 ppmvd @ 15% O_2 on distillate oil

   a. Make and Model: TBD
   b. Catalyst Type: TBD

FIRM NAME: CPV Towantic~~ Energy~~, LLC
EQUIPMENT LOCATION: Woodruff Hill Road, Oxford, CT
EQUIPMENT DESCRIPTION: General Electric ~~PG7241 (FA)~~7HA.01 combustion turbine with DLN combustor

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART I. DESIGN SPECIFICATIONS, cont.

D. Stack Parameters

1. Minimum Stack Height (ft): 150 (above base elevation)
2. Minimum Exhaust Gas Flow Rate (acfm): ~~990,000~~663,327 (gas); ~~1.15 x 10^6~~860,408 (oil)
3. Minimum Stack Exit Temperature (°F): ≥~~206~~170
4. Minimum Distance from Stack to Nearest Property Line (ft): ~~165~~188

PART II. OPERATIONAL CONDITIONS

A. Turbine

1. Fuel Type(s): Natural Gas; Distillate Fuel Oil
2. Maximum Fuel Consumption over any Consecutive 12 Month Period: ~~1.462922~~2.15 x 10^{10} ft^3 (gas); ~~9.6~~1.3 x ~~10^6~~10^7 gallons (oil)
3. Distillate Fuel Oil Sulfur Content (% by weight, dry basis): 0.0015

B. Duct Burner

1. Fuel Type(s): Natural Gas
2. Maximum Fuel Consumption over any Consecutive 12 Month Period: 3.98 x 10^9 ft^3 (gas);

PART III. CONTINUOUS EMISSION MONITORING REQUIREMENTS AN ASSOCIATED EMISSION LIMITS

The Permittee shall comply with the CEM requirements as set forth in RCSA §22a-174-4, RCSA §22a-174-22, 40 CFR 60 Subpart KKKK and 40 CFR Parts 72-78, if applicable. CEM shall be required for the following pollutant/operational parameters and enforced on the following basis:

Pollutant/Operational Parameter	Averaging Times	Emission Limit
Turbine Output	continuous	See Part V
Fuel Flow	continuous	See Part I
Exhaust Flow Rate	continuous	See Part I
Opacity	six minute block	10%
NOx	1 hour block	See Part VI
CO	1 hour block	See Part VI
O_2	1 hour block	None[1]
Humidity	1 hour block	None[1]
Ammonia	1 hour block	See Part VI

Note (1): Parameter to be monitored is not limited by conditions of this permit. Monitoring is required solely to provide basis for correction of actual exhaust gas conditions to dry conditions @ 15% O_2 by volume.

FIRM NAME: CPV Towantic ~~Energy~~, LLC
EQUIPMENT LOCATION: Woodruff Hill Road, Oxford, CT
EQUIPMENT DESCRIPTION: General Electric ~~PG7241 (FA)~~7HA.01 combustion turbine with DLN combustor

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS

A. Monitoring

1. The Permittee shall use a non-resettable totalizing fuel metering device or a billing meter to continuously monitor fuel feed to this permitted source.

2. The Permittee shall continuously monitor and continuously record the SCR aqueous ammonia injection rate (lb/hr), operating temperature (°F) and pressure drop (inches of water) across the catalyst bed. The Permittee shall maintain these parameters within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.

3. The Permittee shall continuously monitor and continuously record the oxidation catalyst inlet temperature (°F). The Permittee shall maintain this parameter within the ranges recommended by the manufacturer to achieve compliance with the emission limits in this permit.

4. The Permittee shall inspect the SCR and oxidation catalysts once per year at a minimum or more frequently if recommended by the manufacturer.

5. The permittee comply with the monitoring requirements of 40 CFR 60.4335 and RCSA 22a-174-22(k).

B. Record Keeping

1. The Permittee shall keep records of monthly and consecutive 12 month fuel consumption (for each fuel). The consecutive 12 month fuel consumption shall be determined by adding (for each fuel) the current month's fuel usage to that of the previous 11 months. The Permittee shall make these calculations within 30 days of the end of the previous month.

2. The Permittee shall keep records of the fuel certification for each delivery of fuel from a bulk petroleum provider or a copy of the current contract with the fuel supplier supplying the fuel used by the equipment that includes the applicable sulfur content of the fuel as a condition of each shipment. The shipping receipt or contract shall include:

   a. date of delivery,
   b. name of the fuel supplier,
   c. type of fuel delivered,

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, cont.

d. percentage of sulfur in such fuel, by weight, dry basis, and
e. the method used to determine the sulfur content of such fuel.

3. The Permittee shall record operating hours for each calendar month and for each period of twelve (12) consecutive calendar months. Such records shall include the dates of the recording period and the total quantity of hours of operation of the turbine during the recording period.

4. Compliance with the emissions limits of Part VI of this permit shall be determined by means of CEM systems, where applicable. Otherwise, periodic stack emissions testing, parametric monitoring and periodic record keeping shall be used to demonstrate compliance with the emissions limits of Part VI of this permit.

5. The Permittee shall calculate and record the monthly and consecutive 12 month PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, and VOC emissions in units of tons. The consecutive 12 month emissions shall be determined by adding (for each pollutant) the current month's emissions to that of the previous 11 months. Such records shall include a sample calculation for each pollutant. The Permittee shall make these calculations on or before the 15th day of each calendar month.

   a. For each Criteria Pollutant monitored by CEM system, emissions shall be calculated based on the actual, ~~uncorrected~~measured emissions concentrations and actual, ~~uncorrected exhaust gas~~measured fuel flowrate measured by the CEM systems.

   b. For each Criteria Pollutant that is not monitored by CEM system, emissions shall be calculated according to the following formulas:

$$ME_{cp,\,gas} = [\Sigma(ERss,gas*Hiss,gas) + \Sigma(ERsu,gas*Nsu,gas) + \Sigma(ERso,gas*Nso,\,gas)]/2000$$

$$ME_{cp,\,oil} = [\Sigma(ERss,ou*Hiss,oil) + \Sigma(ERsu,ou*Nsu,ou) + \Sigma(ERso,oil*Nso,ou)]/2000$$

$$ME_{cp} = ME_{cp,\,gas} + ME_{cp,\,oil}$$

Where:
ME_{cp}=the total monthly emissions of criteria pollutant (tons per month)
$ME_{cp,oil}$= monthly emissions of criteria pollutant from burning distillate oil (tons per month)
$ME_{cp,gas}$= monthly emissions of criteria pollutant from burning natural gas (tons per month)

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, cont.

$ER_{ss,gas}$ = applicable #/~~mmbtu~~MMBtu emission rate contained in Part VI.A.1 of this Permit
$ER_{ss,oil}$ = applicable #/~~mmbtu~~MMBtu emission rate contained in Part VI.A.2 of this Permit
$Hi_{ss,gas}$ = total heat input (~~mmbtu~~MMBtu) from burning natural gas at steady-state during the month
$Hi_{ss,ou}$ = total heat input (~~mmbtu~~MMBtu) from burning distillate oil at steady-state during the month
$ER_{su,gas}$ = natural gas startup emission factor determined during initial stack tests
$ER_{su,ou}$ = distillate oil startup emission factor determined during initial stack tests
$N_{su,gas}$ = number of natural gas startups occurring during the month
$N_{su,oil}$ = number of distillate oil startups occurring during the month
$ER_{sd,gas}$ = natural gas shutdown emission factor determined during initial stack tests
$ER_{sd,oil}$ = distillate oil shutdown emission factor determined during initial stack tests
$N_{sd,gas}$ = number of natural gas shutdowns occurring during the month
$N_{sd,oil.}$ = number of distillate oil shutdowns occurring during the month

6. The Permittee shall keep records of the emissions of this turbine during the shakedown period. Emissions during shakedown shall be calculated using good engineering judgment and the best data and methodology available for estimating such emissions. Emissions during shakedown shall be counted towards the source's annual emission limitation in Part VI.C of this permit.

7. The Permittee shall calculate and record the monthly emissions from these premises of each Hazardous Air Pollutant listed in Subsection ll2(b} of the Clean Air Act. Such records shall include the recording period, the name of each Hazardous Air Pollutant emitted, and the quantity (expressed in units of tons} of each Hazardous Air Pollutant emitted during the calendar month. Emission rates of Hazardous Air Pollutants shall be based upon initial and periodic stack emissions testing as required in accordance with Part VII of this permit.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, cont.

8. The Permittee shall keep records of startup and shutdown events. Such records shall contain the following information:

   a. date and time of startup or shutdown event,
   b. fuel being used during startup or shutdown event,
   c. duration of startup or shutdown event,
   d. type of startup or shutdown event,
   e. total NOx, VOC and CO emissions emitted (lb) during the startup or shutdown event.

9. The Permittee shall keep records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the stationary gas turbine; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative. [40 CFR §60.7(b)]

10. The Permittee shall record all exceedances of any emission limits or deviations from manufacturer recommended operating parameters contained in this permit. Such records shall include the following for each exceedance or deviation:

    a. the date and time,
    b. a detailed description, and
    c. the duration.

11. The Permittee shall keep records of each delivery of aqueous ammonia. The records shall include the date of delivery, the name of the supplier, the quantity of aqueous ammonia delivered, and the percentage of ammonia in solution, by weight.

12. The Permittee shall keep records of the inspection and maintenance of the SCR and oxidation catalysts. The records shall include the name of the person, the date, the results or actions and the date the catalyst is replaced.

13. The Permittee shall provide the Town of Oxford with a copy of the results of the quarterly Continuous Emissions Monitoring reports required by this permit. The Permittee shall provide the reports contemporaneous with their submission to the ~~DEP~~DEEP.

14. The Permittee shall keep a certified copy of this permit on the premises at all times, and shall make this copy available upon request of the Commissioner for the duration of this permit. This copy shall also be available for public inspection during regular business hours.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IV. MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS, cont.

15. The Permittee shall keep all records required by this permit for a period of no less than five years and shall submit such records to the commissioner upon request.

C. Reporting

1. The Permittee shall submit a report of all exceedances or deviations for any emission limits or operating parameters contained in this permit to the commissioner within ten days of the exceedance or deviation. Such report shall include the following:

   a. copies of the exceedance records for the month, as recorded in Part IV.B.10 of this permit,
   b. an explanation of the likely causes of the exceedances, and
   c. an explanation of remedial actions taken to correct the exceedance.

2. The Permittee shall notify the commissioner, in writing, of any emergency affecting the equipment described in this permit or malfunction of the equipment described in this permit. The Permittee shall submit such notification within ten days of the emergency or malfunction. The notification shall include the following:

   a. a description of the emergency or malfunction and a description of the circumstances surrounding the cause or likely cause of such emergency or malfunction and,
   b. a description of all corrective actions and preventive measures taken and/or planned with respect to such emergency or malfunction and the dates of such actions and measures.

3. The Permittee shall notify the commissioner, in writing, of the dates of commencement of construction, initial startup and commencement of commercial operation of this source. Such written notifications shall be submitted no later than 30 days after the subject event. Commencement of commercial operations shall mean the date when the unit is released to ISO-New England for dispatch.

4. The permittee shall submit all required reports to the Commissioner as required pursuant to Sections 22a-174-19a(j), 22a-174-22(l) and 40 CFR 60.4375.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART V. OPERATING REQUIREMENTS

A. "Steady-state" operation shall be defined as operation of the turbine when the rate of change in load, with respect to time, is zero; except for such operation that occurs during periods of start-up, shutdown, fuel switching, and equipment cleaning. Additionally, steady-state operation shall include all modes of operation during which the turbine load equals or exceeds 50% of the manufacturer's specified maximum for this turbine.

B. "Transient" operation shall be defined as operation of the turbine when the rate of change in load, with respect to time, is less than or greater than zero. Additionally, transient operation shall include and describe the operation of the turbine during all phases of start-up, shutdown, fuel switching and equipment cleaning where the turbine load is less than 50% of the manufacturer's specified maximum. No period of transient operation shall ever exceed ~~240~~60 consecutive minutes.

C. "Malfunction" shall be defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment or a process to operate in a normal or usual manner. Failures that were caused in part by poor maintenance or careless operation are not malfunctions.

D. "Shakedown" shall be defined as turbine operations including, but not limited to, the first firing of the turbine, proof of interlocks, steam blowing, chemical cleaning and initial turbine roll. Shakedown shall be considered complete upon commencement of commercial operation.

E. "Emergency" shall be defined as any situation arising from sudden and reasonably unforeseeable events beyond the control of this source, including acts of God, which situation would require immediate corrective action to restore normal operation, and that causes the source to exceed a technology based limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance due to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operations, operator error or decision to keep operating despite knowledge of these things.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION BUREAU OF AIR MANAGEMENT

PART V. OPERATING REQUIREMENTS

~~F. When burning distillate oil, the turbine shall not operate in steady-state at less than 100% of the manufacturer's specified maximum load except during times of start-up, shut-down or fuel switching. At all times when burning distillate oil, the bypass damper of the low-pressure economizer shall be automatically activated. The Permittee shall ensure that the bypass systems are incorporated into the design and construction of the turbine and maintained in good operating condition.~~

F.

G. This turbine shall not be operated, in steady-state, at any load less than ~~50~~30% of the maximum load specified by the manufacturer.

H. The Permittee shall meet all applicable requirements of the Federal Acid Rain Program codified in Title 40 CFR Parts 72-78, inclusive, by the deadlines set forth within that body of regulation.

I. The Permittee shall comply with all applicable requirements of Section 22a-174-4 of the RCSA entitled, "Source Monitoring, Record Keeping, Reporting, and Authorization of Inspection of Air Pollution Sources".

J. The Permittee shall operate and maintain this equipment in accordance with the manufacturer's specifications and written recommendations. The Permittee shall operate and maintain this stationary combustion turbine, air pollution control equipment, and monitoring equipment in a manner consistent with good air pollution control practices for minimizing emissions at all times including during startup, shutdown, and malfunction.

K. The Permittee shall operate this facility at all times in a manner so as not to violate or contribute significantly to the violation of any applicable state noise control regulations, as set forth in RCSA Sections 22a-69-1 through 22a-69-7.4. (State Only Requirement]

L. For one calendar year from the date of commencement of commercial operation, the Permittee shall track emissions of CO, NOx, VOC, ammonia and PM-10/2.5 during transient operation of the turbine. Emissions of ammonia, CO and NOx shall be tracked by means of the required continuous emissions monitoring systems. Emissions of VOC and PM-10/2.5 shall be correlated to fuel flow, turbine output or the combination thereof during the initial stack tests performed in accordance with Part VII of this permit. Emissions of VOC and PM-10/2.5 shall be tracked during transient operation by monitoring fuel flow, turbine output, or the combination thereof and estimating the resulting emissions according to the correlation developed during the initial stack tests.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION BUREAU OF AIR MANAGEMENT

PART V. OPERATING REQUIREMENTS, cont.

1. Within sixty (60) days of the end of one (1) calendar year of commercial operation of the turbine, the Permittee shall submit a report of observed transient emissions and of any operating parameters observed in order to estimate transient emissions. This permit shall be subject to modification to include a table of emission limits for CO, NOx, VOC, ammonia and PM-10 during transient operation of the turbine. Following the modification of this permit, emissions of CO, NOx, VOC, ammonia and PM-10 during the transient operation of this turbine shall not exceed the limits of said table.

M. The Permittee shall monitor and record ammonia slip emissions from this source during the first 36 months of commercial operation. Records shall also include SCR catalyst degradation over time and lifecycle costs, ammonia emissions over time, costs for ~~catalysts~~SCR catalyst and equipment, and emerging SCR technology. This data shall be recorded and maintained on the premises and is in addition to any monitoring required under Part III of this permit. The following requirements apply:

1. No later than 60 days from the last day of each calendar year of commercial operation of this source the Permittee shall submit a summary of operating data collected during the previous year, to the commissioner. This summary report is not required to be submitted for the last year of the ammonia slip monitoring required under Part V.M of this permit.

2. No later than 120 days from the last day of the third calendar year of commercial operation of this source the Permittee shall submit a final report summarizing the results of the ammonia slip monitoring required under Part V.M of this permit, including conclusions regarding ammonia slip emissions during oil firing, to the commissioner.

3. If, after submitting the report described in Part V.M.2 of this permit, there is a lack of data at the end of 36 months to make a good engineering determination regarding ammonia slip emissions, the commissioner may extend the ammonia slip monitoring under Part V.M of this an additional 24 months and the final report shall be submitted no later than 120 days from the last day of the fifth calendar year of commercial operation of this source.

4. The permittee shall design the SCR system to meet an ammonia slip limit of 2 ppmvd while firing natural gas only. However, the enforceable limit shall remain 5 ppmvd for both allowable fuels.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART VI. ALLOWABLE EMISSION LIMITS

The Permittee shall not cause or allow this equipment to exceed the emission limits stated herein at any time.

An exceedance of either (i) the emission limits in the tables below, or (ii) the emissions limits developed for this permit due to an emergency; malfunction, or cleaning shall not be deemed a "Federally Permitted Release," as that term is used in 42 U.S.C. 9601(10).

The Permittee shall not cause or allow emissions of Hazardous Air Pollutants to exceed the Maximum Allowable Stack Concentration, calculated in accordance with Section 22a-174-29 of the RCSA, for each and every pollutant listed on Table 29-1, Table 29-2, or Table 29-3 that is emitted from this turbine. Compliance with Section 22a-174-29 shall be demonstrated for both transient operation and steady-state operation based on actual exhaust gas composition and volumetric flow.

A. Steady State

- Ambient Temperature = 59 °F
- Barometric pressure = 14.28 psia
- Relative Humidity = 60%
- Turbine Load = 100%

1. When burning Natural Gas, the Permittee shall not allow or cause emissions from the turbine, after the application of control equipment to exceed the following:

Without Duct Firing			
Criteria Pollutant	#/hr	#/mmbtu	ppmvd @ 15% O_2
PM-10/2.5	~~14.0~~9.73	~~8E~~4.1E-3	
SOx	~~1.42~~4.49	~~8.1E-4~~1.5E-3	
NOx	~~12.88~~19.40	7.4E-3	2.0
VOC	~~2.66~~3.37	1.~~52E~~28E-3	1.0
CO	~~7.73~~5.31	~~4.42E~~2.02E-3	~~2.~~0.9

With Duct Firing			
Criteria Pollutant	#/hr	#/mmbtu	ppmvd @ 15% O_2
PM-10/2.5	20.4	8.1E-3	
SOx	6.20	1.5E-3	
NOx	26.8	7.4E-3	2.0
VOC (2 turbines operating)	5.13	1.93E-3	2.0
VOC (1 turbine operating)	8.82	2.57E-3	2.0
CO	13.8	3.81E-3	1.7

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART VI. ALLOWABLE EMISSION LIMITS, continued

2. When burning Distillate Oil, the Permittee shall not allow or cause emissions from the turbine, after the application of control equipment to exceed the following:

Criteria Pollutant	#/hr	#/mmbtu	ppmvd @ 15% O2
PM-10/2.5	~~36.9~~42.6	~~1.9E~~2.04E-2	
SOx	~~2.91~~4.92	1.5E-3	
NOx	~~42.22~~52.00	~~2.2E~~1.94E-2	5.~~9~~0
VOC	~~5.3~~6.19	2.73E-3	2.0
CO	~~9.25~~12.70	4.76E-3	2.0

3. Hazardous Air Pollutant Emission Limits

   a. The Permittee shall comply with the following limitations:

Hazardous Air Pollutants	Limit
Ammonia	5 ppmvd

4. Opacity

   Shall not exceed 10% during any six minute block average as measured by 40 CFR 60, Appendix A, Reference Method 9.

B. Transient Operation

The Permittee shall minimize emissions during periods of startup and shutdown by the following work practices. Start the ammonia injection as soon as minimum catalyst temperature is reached.

(See Part V.L of this permit for additional requirements.)

C. The Permittee is not required to demonstrate compliance with the short-term emission limits stated herein during the shakedown period. The shakedown period shall not extend beyond the required date for initial performance tests. Emissions during this period shall be counted towards the annual emission limits stated herein.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

D. Total Allowable Emissions

1. Criteria Pollutants

Criteria Pollutants	Annual Emissions (TPY)
PM-10/2.5	~~98.3~~76.7
SOx	19.7~~.1~~
NOx	~~66.8~~94.7
VOC	~~13.2~~24.5
CO	~~85.9~~64.5

2. Hazardous Air Pollutants: Section 112(b) of the Clean Air Act Amendments of 1990

The Permittee shall not cause or allow emissions of 10 tons/year or more of any individual HAP or 25 tons of any combination of HAP, on an annual basis from this premises.

E. Demonstration of compliance with the above emission limits shall be met by calculating the emission rates using emission factors from the following sources:

1. NOx, CO, Ammonia: Most recent CEM data.
2. SOx: AP-42 Table 3.1-2a Calculated from 0.0015%S or less in fuel oil.
3. PM-10 and VOC: Most recent stack test data.
4. VOC: Correlating the VOC emissions to the CO emissions using the results of a diagnostic stack test and tracked using the CO CEMS.

The commissioner may require other means (e.g. stack testing) to demonstrate compliance with the above emission limits, as allowed by state or federal statute, law or regulation.

PART VII. STACK EMISSION TEST REQUIREMENTS

A. Stack testing shall be performed in accordance with the latest Emission Test Guidelines available on the ~~DEP~~DEEP website:

~~*http://www.ct.gov/dep/cwp/view.asp?a=2684&q=322076&depNav_GID=1619*~~http://www.ct.gov/deep/lib/deep/air/compliance_monitoring/emission_test/emission_test_guidelines.pdf

Stack emission testing shall be required for the following pollutants for both fuels:

☒ $PM_{10}/PM_{2.5}$ ☒ SOx ☒ NOx ☒ CO ☒ VOC

☒ Hazardous Air Pollutants listed below:

FIRM NAME: CPV Towantic~~ Energy~~, LLC
EQUIPMENT LOCATION: Woodruff Hill Road, Oxford, CT
EQUIPMENT DESCRIPTION: General Electric ~~PG7241 (FA)~~7HA.01 combustion turbine with DLN combustor

Town No: 144 Premises No: 014 Permit No: 0011 Stack No: 2

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART VII. STACK EMISSION TEST REQUIREMENTS, continued

Natural Gas F1ring:

Hazardous A1r Pollutant	Hazardous A1r Pollutant
1,3-Butadiene	Formaldehyde
Acetaldehyde	Naphthalene
Acrolein	Propylene Oxide
Ammonia	Sulfuric Acid
Benzene	Toluene
Ethyl Benzene	Xylene
Polynuclear Aromatic Hydrocarbons(PAH)	

D1st1llate Oil F1r1ng:

Hazardous A1r Pollutant	Hazardous A1r Pollutant
Arsenic	Selenium
Beryllium	Benzene
Cadmium	1,3-Butadiene
Chromium	Formaldehyde
Lead	Sulfuric Acid
Mercury	Nickel
1,4-Dichlorobenzene	Carbon Tetrachloride
Chlorobenzene	Chloroform
Ethylene Dichloride	Vinylidene Chloride
Tri-chloroethylene	Tetra-chloroethylene
Vinyl Chloride	Methylene Chloride
Polynuclear Aromatic Hydrocarbons (PAH)	

Note: Stack emission testing for NOx shall be conducted according to the requirements in RCSA 22a-174-22(k) and 40 CFR Part 60 Subpart KKKK.

Stack test results shall be reported as follows: all pollutants in units of lb/hr and PM-10/2.5 1n units of lb/MMBTU, NOx and CO in units of ppmvd at 15% O_2, ammonia and HAPs in units of $\mu g/m^3$ and ppmvd at 15% O_2.

All stack emissions tests shall be conducted in accordance with the requirements of Section 22a-174-5 of the RCSA. The Commissioner may attach additional requirements to the requirements of Section 22a-174-5 in order to demonstrate continual compliance with the requirements of this permit.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART VII. STACK EMISSION TEST REQUIREMENTS, cont.

The Permittee shall perform one set of initial stack tests on the turbine when burning natural gas without duct firing, one set of initial stack tests when burning natural gas with duct firing and one set of initial stack tests ~~whenburning~~when burning distillate oil.

B. The Permittee shall conduct initial stack testing within 60 days of achieving the maximum production rate, but not later than 180 days after initial startup. Test results must be submitted within 45 days after testing.

Testing being conducted pursuant to 40 CFR Part 60, the test report is to be submitted within 180 days after the initial startup date or within 60 days after reaching maximum production rate. [40 CFR §60.8(a)]

C. Testing shall be performed at least once every three years from the date of the initial compliance stack test required in Part VII.A of this permit for all pollutants listed in Part VII.A with the following exceptions:

1. After the initial stack test, stack testing may not be required for pollutants requiring CEMs (NOx, CO, and NH_3). The commissioner retains the right to require stack testing of any pollutant at any time to demonstrate compliance.

2. Fuel oil analysis of the metals in the distillate oil may be substituted for stack testing for metallic HAPs while firing distillate oil.

PART VIII. SPECIAL REQUIREMENTS

A. The Permittee has purchased external emission reductions to comply with §22a-174-3(1) of the RCSA. The emissions reductions offset NOx emissions allowable under Permit Nos.144-0010, 144-0011, 144-0015, 144-0016, 144-0018 at a ratio of 1.2 to 1. The external emission reductions were secured, approved and made federally enforceable prior to issuance of this construction permit.

Pollutant	Total Reductions Required	Total Reductions Obtained
NOx	~~174~~233.6	~~177~~233.6

The emission reductions were obtained from Consolidated Edison Company of New York, Incorporated (ConEdison) and conform to the requirements of the United States Environmental Protection Agency (USEPA) Economic Incentive Program Rules; Final Rules, published April 7, 1994, (Federal Register, Volume 69, page 16690) and the USEPA Emissions Trading Policy Statement, published December 4, 1986 (Federal Register, Volume 51,

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PART VIII. SPECIAL REQUIREMENTS, continued

Number 233). Specifically, the reductions are real, quantifiable, surplus, permanent, and enforceable since they were reviewed and transferred to Towantic Energy LLC in accordance with the ***Interim Reciprocity Agreement by* and *between the State of Connecticut* Department of *Energy and Environmental Protection* and *the State of New York* Department of *Environmental Conservation* on *the Interstate Trading of Emission Reduction Credits,*** executed February 1, 1999. The Permittee shall maintain ownership of the emissions reductions for the life of the electric generating facility.

B. The Permittee shall comply with all applicable requirements of the Federal Acid Rain Program codified in Title 40 CFR Parts 72-78, inclusive, by the deadlines set forth within the aforementioned regulation.

C. The Permittee shall notify the commissioner, in writing, of the commencement of construction, completion of construction and commencement of commercial operation of this source. Such written notifications shall be submitted no later than 30 days after the subject event.

D. Prior to commencement of construction, the Permittee shall submit to the Commissioner copies of the manufacturer's specifications for all air pollution control equipment to be used with this turbine.

E. Upon completion of construction, the Permittee shall certify to the Commissioner, in writing, that the facility has been constructed in accordance with the terms and conditions of its construction permit.

F. Upon completion of construction of the turbines and control equipment regulated under Permit #144-0010 and Permit #144-0011, the Permittee shall prepare and submit a written standby plan in accordance with subdivision (d)(2) of Section 22a-174-6 of the RCSA. The standby plan shall be subject to the requirements of subdivisions (d)(2) through (d)(5) of Section 22a-174-6 of the RCSA. The Permittee shall not operate the sources regulated under Permits #144-0010 and #144-0011 until the Commissioner has approved a standby plan submitted in accordance with this permit.

G. Upon completion of construction of the turbines and control equipment regulated under Permit #144-0010 and Permit #144-0011, the Permittee shall submit a comprehensive operation and maintenance plan for all air pollution emitting activities and the air pollution control equipment, which will ensure continuous compliance with applicable regulations and permit conditions. The Permittee shall not operate the sources regulated under Permits #144-0010 and #144-0011 until the Commissioner has

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART VIII. SPECIAL REQUIREMENTS, continued

approved an operation and maintenance plan submitted in accordance with this permit.

~~H. Prior to the completion of construction, the Permittee shall submit a report to the Commissioner on the feasibility of using solid ammonia, urea, as an alternative to aqueous ammonia for the control of NOx emissions. The Commissioner may prescribe the information required in this report. If the Commissioner determines that the use of urea is feasible, he may modify the permit to require its use.~~

H.

PART IX. ADDITIONAL TERMS AND CONDITIONS

A. The Permittee shall comply with all applicable requirements of Section 22a-174-6 of the RCSA, entitled "Air Pollution Emergency Episode Procedures".

B. The Permittee shall comply with all applicable sections of the following New Source Performance Standard(s) at all times.

Title 40 CFR Part 60, Subpart: KKKK and A

Copies of the Code of Federal Regulations (CFR) are available online at the U.S. Government Printing Office website.

C. The Permittee shall comply with all applicable requirements of RCSA 22a-174-22c - The Clean Air Interstate Rule (CAIR) Nitrogen Oxides (NOx) Ozone Season Trading Program.

D. The Permittee shall comply with all applicable requirements of RCSA 22a-174-19a - Control of sulfur dioxide emissions from power plants and other large stationary sources of air pollution.

E. The Permittee shall comply with all applicable requirements of RCSA 22a-174-31 - Control of Carbon Dioxide Emissions. [State Only Requirement]

F. This permit does not relieve the Permittee of the responsibility to conduct, maintain and operate the regulated activity in compliance with all applicable requirements of any federal, municipal or other state agency. Nothing in this permit shall relieve the Permittee of other obligations under applicable federal, state and local law.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IX. ADDITIONAL TERMS AND CONDITION, continued

G. Any representative of the ~~DEP~~DEEP may enter the Permittee's site in accordance with constitutional limitations at all reasonable times without prior notice, for the purposes of inspecting, monitoring and enforcing the terms and conditions of this permit and applicable state law.

H. This permit may be revoked, suspended, modified or transferred in accordance with applicable law.

I. This permit is subject to and in no way derogates from any present or future property rights or other rights or powers of the State of Connecticut and conveys no property rights in real estate or material, nor any exclusive privileges, and is further subject to any and all public and private rights and to any federal, state or local laws or regulations pertinent to the facility or regulated activity affected thereby. This permit shall neither create nor affect any rights of persons or municipalities who are not parties to this permit.

J. Any document, including any notice, which is required to be submitted to the commissioner under this permit shall be signed by a duly authorized representative of the Permittee and by the person who is responsible for actually preparing such document, each of whom shall certify in writing as follows: "I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute."

K. Nothing in this permit shall affect the commissioner's authority to institute any proceeding or take any other action to prevent or abate violations of law, prevent or abate pollution, recover costs and natural resource damages, and to impose penalties for violations of law, including but not limited to violations of this or any other permit issued to the Permittee by the commissioner.

L. Within 15 days of the date the Permittee becomes aware of a change in any information submitted to the commissioner under this permit, or that any such information was inaccurate or misleading or that any relevant information was omitted, the Permittee shall submit the correct or omitted information to the commissioner.

PERMIT FOR FUEL BURNING EQUIPMENT

STATE OF CONNECTICUT, DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
BUREAU OF AIR MANAGEMENT

PART IX. ADDITIONAL TERMS AND CONDITIONS, continued

M. The date of submission to the commissioner of any document required by this permit shall be the date such document is received by the commissioner. The date of any notice by the commissioner under this permit, including but not limited to notice of approval or disapproval of any document or other action, shall be the date such notice is personally delivered or the date three days after it *is* mailed by the commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.

N. Any document required to be submitted to the commissioner under this permit shall, unless otherwise specified in writing by the commissioner, be directed to: Office of Director; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.

ATTACHMENT O – COASTAL CONSISTENCY REVIEW FORM

Not required, as the Project is not located within the coastal zone or in a coastal community.

ATTACHMENT P – COPY OF RESPONSE TO REQUEST FOR NATURAL DIVERSITY DATABASE (NDDB) STATE LISTED SPECIES REVIEW FORM

A copy of the letter received on June 10, 2014 in response to the Natural Diversity Database (NDDB) State Listed Species Review request made for the Project on March 21, 2014. Although some recommended actions are noted to avoid potential species impacts, no threatened or endangered species or sensitive communities are identified on the Project site.

Connecticut Department of

ENERGY & ENVIRONMENTAL PROTECTION

Bureau of Natural Resources
Wildlife Division
Natural History Survey – Natural Diversity Data Base

June 10, 2014

Ms. Lynn Gresock
Tetra Tech, Inc.
238 Little Road, Suite 201-B
Westford, MA 01886

Regarding: CPV Towantic Energy Center, Oxford, CT – Commercial/Industrial Development
Natural Diversity Data Base 201405771

Dear Ms. Gresock:

In response to your request for a Natural Diversity Data Base (NDDB) Review of State Listed Species for the CPV Towantic Energy Center in Oxford, CT, our records for this site indicate the following extant populations of species on or within the vicinity of the site:

Red bat (*Lasiurus borealis*) Protection Status: Species of Special Concern

Red bats are considered to be "tree-roosting" bats. They roost out in the foliage of deciduous and coniferous trees, camouflaged as dead leaves or cones. Red bats are primarily solitary roosters. They can be found roosting and feeding around forest edges and clearings. Typically, larger diameter trees (12-inch DBH and larger) are more valuable to these bats. Additionally, trees with loose, rough bark such as maples, hickories, and oaks are more desirable than other tree species due to the increased cover that the loose bark provides. Large trees with cavities are also utilized by this species. Retaining the above mentioned trees, wherever possible, may minimize the potential for negative impacts to this state-listed species.

Hoary bat (*Lasiurus cinereus*) Protection Status: Species of Special Concern

Hoary bats are found in Connecticut during the spring and summer seasons and migrate south to overwinter. Their diet primarily consists of moths and beetles. These bats will roost high in large coniferous and deciduous trees.

Silver-haired bat (*Lasionycteris noctivagans*) Protection Status: Species of Special Concern

Silver-haired bats typical roost sites include tree foliage, tree hollows, and crevices behind loose bark, but they are most likely to be found near water. They will typically give birth to their young in June or July, and the young will stay in roost until August.

Recommendations: Work should be conducted in the winter when the bats are not in the area, specifically work should not be conducted between May 1st through August 15th. Long-term impacts can be minimized by retaining large diameter coniferous and deciduous trees whenever possible, particularly close to brooks and streams. If these bats are found, please report the information to the Wildlife Division.

Eastern box turtle (*Terrapene carolina Carolina*) Protection Status: Species of Special Concern

Eastern box turtles inhabit old fields and deciduous forests, which can include power lines and logged woodlands. They are often found near small streams and ponds. The adults are completely terrestrial but the young may be semiaquatic, and hibernate on land by digging down in the soil from October to April. They have an extremely small home range and can usually be found in the same area year after year. Eastern box turtles have been negatively impacted by the loss of suitable habitat. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated.

Recommendations: The following guidelines should be implemented:

❖ Siltation and Erosion Control Measures:

- Where possible, AVOID installing sediment and erosion control materials from 1) late August through September and 2) from March through mid-May. These two time periods are when amphibians and reptiles are most active, moving to and from wetlands to breed.

- Most wildlife travels between different habitats throughout the year, the layout of how sediment and erosion control materials are placed is very important. If silt fencing needs to be installed and left up during peak times of amphibian migration, we recommend that it be installed in such a way to allow for animals to pass through. We would encourage a staggered layout for silt fence installation. We would be happy to provide additional guidance on placement of sediment and erosion control materials to limit impacts to wildlife.

- The use of erosion control products with netting embedded in the product to maintain its shape and structure, has been shown to be fatal to wildlife in Connecticut, in particular snakes. Snakes can get tangled and trapped within the netting as they maneuver through the net openings. When reptiles are trapped, their ability to thermoregulate is compromised and in areas exposed to sun, trapped reptiles quickly overheat and die. To limit the potential for needless mortality to long-lived reptiles, we recommend the following considerations:

    - Given the high variability of the composition of products with bio-degradable and degradable netting, we recommend that these products NOT be used.

    - Use erosion control options that DO NOT contain netting such as net-less blankets or hay bales.

    - Reconfigure/lower the grade of slopes so products without netting can be utilized.

  - Siltation and erosion control measures should be removed as soon as soils are stable so as to not impede reptile and amphibian migrations between wetlands and uplands.

- ❖ Rip-rap: If rip-rap is going to be used, consider covering the rip-rap with local stream bank material.

- ❖ Stockpiles of Soil: Stockpiles of soil should be cordoned off with silt fencing so turtles do not attempt to try and nest in them.

- ❖ Native Plantings: Any plantings should be composed of species native to northeastern United States and appropriate for use in riparian habitat.

The Natural Diversity Data Base includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. If the project is not implemented within 12 months, then another Natural Diversity Data Base review should be requested for up-to-date information.

Please be advised a more detailed review may be conducted as part of any subsequent environmental permit applications submitted to the Department of Energy and Environmental Protection for the proposed site. Should state involvement occur in some other manner, specific restrictions or conditions relating to the species discussed above may apply.

Thank you for consulting the Natural Diversity Data Base. If you have further questions, I can be reached by email at Elaine.hinsch@ct.gov or by phone at (860) 424-3011.

Sincerely,
/s/
Elaine Hinsch
Program Specialist II
Wildlife Division

ATTACHMENT Q – CONSERVATION OR PRESERVATION RESTRICTION INFORMATION

Not required, as no conservation or preservation restrictions are associated with the Project site.

ATTACHMENT R – COPY OF WRITTEN ENVIRONMENTAL JUSTICE PUBLIC PARTICIPATION PLAN APPROVAL LETTER

Not required, as the Project is not located in an Environmental Justice community.

APPENDIX A – SUPPORTING EMISSIONS CALCULATIONS

Summary of Facility-Wide Potential Annual Emissions - GE 7HA.01 9/3/2014
CPV Towantic Energy, LLC

Facility-Wide Potential Annual Emissions (TPY)

Pollutant	Unit 1 (CT & HRSG) (tpy)	Unit 2 (CT & HRSG) (tpy)	Auxiliary Boiler (tpy)	Emergency Generator (tpy)	Fire Pump (tpy)	Fugitive Emissions (tpy)	Facility Total (tpy)
NO_x	94.7	94.7	2.02	2.98	0.40	N/A	194.7
CO	64.5	64.5	6.83	0.32	0.09	N/A	136.2
VOC	24.5	24.5	0.75	0.08	0.01	N/A	49.9
SO_2	19.7	19.7	0.28	0.003	0.001	N/A	39.7
PM	76.7	76.7	1.29	0.02	0.01	N/A	154.7
PM_{10}	76.7	76.7	1.29	0.02	0.01	N/A	154.7
$PM_{2.5}$	76.7	76.7	1.29	0.02	0.01	N/A	154.7
CO_2	1,326,584	1,326,584	21,605	353	60	N/A	2,675,185
CH_4	24.6	24.6	0.407	0.014	0.0024	21.6	71.3
N_2O	2.72	2.72	0.041	0.003	0.0005	N/A	5.48
CO_2e	1,328,009	1,328,009	21,627	354	60	554	2,678,612
H_2SO_4	12.66	12.66	0.02	0.0002	0.00004	N/A	25.3
Lead (Pb)	1.7E-02	1.7E-02	9.1E-05	1.7E-06	2.8E-07	N/A	0.034
NH_3	77.7	77.7	N/A	N/A	N/A	N/A	155.3
Total HAPS	5.60	5.60	0.35	0.01	0.003	N/A	11.6

Vendor Emissions 7HA.01 Combustion Turbine & Duct Burner
CPV Towantic Energy, LLC

AMBIENT CONDITIONS:	-14.2°F						59°F				90°F		100°F				
GE CASE #:	#1	#2	#3	#4	#28	#29	#35	#9	#31	#32	#36	#13	#14	#16	#17	#23	#24
Fuel	Natural Gas																
Number of GTs Operating	2	2	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2
GT Operating Load	BASE	BASE	BASE	BASE	75%	50%	BASE	BASE	75%	50%	BASE	BASE	BASE	BASE	BASE	75%	50%
Fuel Heating Value, Btu/lb (HHV)	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809	22,809
Evaporative Cooler Status	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	Off	Off
Duct Burner Status	Fired	Fired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Fired	Fired	Unfired	Unfired	Unfired
Chiller Status	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Ambient Relative Humidity, %	20	20	20	20	20	20	60	60	60	60	60	60	40	40	40	40	40
BAROMETRIC PRESSURE, psia	14.30	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
GT Heat Input (MMBtu/hr/unit, HHV)	2,526	2,526	2,526	2,526	2,047	1,582	2,426	2,426	2,017	1,538	2,213	2,303	2,297	2,297	2,297	1,686	1,308
DB Heat Input (MMBtu/hr/unit, HHV)	198	97	962	0	0	0	110	0	0	0	209	0	190	766	0	0	0
Net Power (kW)	824,384	799,755	499,169	775,214	609,074	442,484	791,905	765,698	589,174	420,106	722,051	702,508	730,334	423,370	687,889	485,913	349,487
Gross Power (kW)	836,396	810,532	508,975	784,998	617,403	449,562	804,949	777,538	598,755	428,041	735,670	714,007	743,946	433,792	699,335	495,367	357,890
Heat Rate (Btu/kW-hr, gross)	6,514	6,473	6,854	6,437	6,631	7,038	6,302	6,241	6,736	7,184	6,584	6,452	6,684	7,060	6,568	6,805	7,309
Heat Rate (Btu/kW-hr, net)	6,609	6,560	6,989	6,518	6,722	7,150	6,405	6,337	6,846	7,320	6,708	6,558	6,809	7,234	6,677	6,937	7,485
	935894.94																
HRSG STACK EXHAUST GAS																	
Exhaust Flow, lb/hr	5,021,800	5,017,200	5,057,000	5,012,700	4,031,000	3,234,000	4,655,900	4,647,300	3,828,300	3,155,300	4,262,100	4,386,900	4,385,100	4,411,700	4,376,400	3,552,200	2,909,600
Stack Temperature, °F	181.9	188.9	170.0	196.4	189.6	180.4	174.2	183.2	180.2	179.0	186.7	196.2	197.2	170.0	202.8	197.1	190.0
O_2, Vol. %	11.55%	11.88%	9.07%	12.20%	12.25%	12.56%	11.18%	11.84%	12.17%	12.80%	10.74%	11.40%	10.69%	8.58%	11.40%	12.35%	12.77%
CO_2, Vol. %	4.36%	4.21%	5.50%	4.06%	4.03%	3.89%	4.43%	4.13%	3.98%	3.69%	4.46%	4.12%	4.45%	5.42%	4.12%	3.74%	3.55%
H_2O, Vol. %	8.45%	8.15%	10.68%	7.86%	7.82%	7.54%	9.58%	8.99%	8.70%	8.13%	11.45%	11.16%	11.81%	13.68%	11.19%	9.80%	9.43%
N_2, Vol. %	74.76%	74.87%	73.88%	74.99%	75.01%	75.12%	73.93%	74.16%	74.27%	74.49%	72.49%	72.46%	72.19%	71.47%	72.43%	73.24%	73.38%
Ar, Vol. %	0.89%	0.89%	0.88%	0.89%	0.89%	0.89%	0.88%	0.88%	0.88%	0.89%	0.87%	0.86%	0.86%	0.85%	0.86%	0.87%	0.87%
MW, lb/lb-mole	28.43	28.45	28.29	28.47	28.47	28.49	28.31	28.35	28.37	28.41	28.11	28.11	28.07	27.96	28.11	28.23	28.25
HRSG EXHAUST STACK EMISSIONS (PER STACK):																	
NOX, ppmvd @ 15% O2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NOX, lb/MMBtu as NO2 (EPA Method 19)	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074
NOX, lb/hr as NO2	20.90	20.10	26.80	19.40	15.50	12.00	19.80	18.40	14.50	11.10	18.40	17.40	18.80	23.30	17.40	12.80	9.89
VOC, ppmvd @ 15% O2 as CH4	1.5	1.5	2.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.5	1.0	1.5	2.0	1.0	1.0	1.0
VOC, lb/MMBtu as CH4 (EPA Method 19)	0.0019	0.0019	0.0026	0.0013	0.0013	0.0013	0.0019	0.0013	0.0013	0.0013	0.0019	0.0013	0.0019	0.0026	0.0013	0.0013	0.0013
VOC, lb/hr as CH4	5.13	4.94	8.82	3.37	2.69	2.08	4.72	3.19	2.53	1.93	4.51	3.03	4.63	7.24	3.02	2.22	1.72
CO, ppmvd @ 15% O2	1.7	1.7	1.7	0.9	0.9	0.9	1.7	0.9	0.9	0.9	1.7	0.9	1.7	1.7	0.9	0.9	0.9
CO, lb/MMBtu (EPA Method 19)	0.0038	0.0038	0.0038	0.0020	0.0020	0.0020	0.0038	0.0020	0.0020	0.0020	0.0038	0.0020	0.0038	0.0038	0.0020	0.0020	0.0020
CO, lb/hr	10.80	10.40	13.80	5.31	4.24	3.28	9.93	5.03	3.98	3.04	9.50	4.78	9.75	12.00	4.76	3.49	2.71
SO2, lb/hr	4.85	4.67	6.20	4.49	3.64	2.81	4.64	4.31	3.42	2.60	4.31	4.09	4.42	5.45	4.08	3.00	2.33
H2SO4, lb/hr	3.11	3.00	3.99	2.89	2.34	1.81	2.98	2.77	2.20	1.67	2.77	2.63	2.84	3.50	2.62	1.93	1.49
H2SO4, lb/MMBtu	0.00114	0.00114	0.00114	0.00114	0.00114	0.00114	0.00117	0.00114	0.00109	0.00109	0.00114	0.00114	0.00114	0.00114	0.00114	0.00115	0.00114
$PM/PM_{10}/PM_{2.5}$, lb/hr	20.00	19.50	20.40	9.73	9.19	8.76	20.30	9.64	9.08	8.65	19.10	9.53	20.10	18.00	9.52	8.86	8.51
$PM/PM_{10}/PM_{2.5}$, lb/MMBtu	0.0073	0.0074	0.0058	0.0039	0.0045	0.0055	0.0080	0.0040	0.0045	0.0056	0.0079	0.0041	0.0081	0.0059	0.0041	0.0053	0.0065
NH_3, ppmvd @ 15% O2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH3, lb/MMBtu (EPA Method 19)	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068	0.0068
NH_3, lb/hr	19.30	18.60	24.70	17.90	14.30	11.10	18.30	17.00	13.40	10.20	17.00	16.10	17.40	21.50	16.10	11.80	9.14
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	323,796	311,778	414,627	300,274	243,307	188,022	301,448	288,363	239,687	182,755	287,847	273,774	295,530	364,023	272,974	200,335	155,455
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	6.01	5.78	7.69	5.57	4.51	3.49	5.59	5.35	4.45	3.39	5.34	5.08	5.48	6.75	5.06	3.72	2.88
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	0.60	0.58	0.77	0.56	0.45	0.35	0.56	0.53	0.44	0.34	0.53	0.51	0.55	0.68	0.51	0.37	0.29
CO_2e, lb/hr (CH4 GWP = 25, N2O GWP = 298)	324,125	312,095	415,048	300,579	243,554	188,213	301,754	288,656	239,931	182,941	288,139	274,053	295,831	364,393	273,251	200,538	155,613
CO_2e, lb/MW-hr (gross)	775.1	770.1	815.5	765.8	789.0	837.3	749.7	742.5	801.4	854.8	783.3	767.6	795.3	840.0	781.5	809.7	869.6

Vendor Emissions 7HA.01 Combu
CPV Towantic Energy, LLC

AMBIENT CONDITIONS:		**-14.2F**				**59°F**		**90°F**		**100°F**		
GE CASE #:	**#37**	**#46**	**#47**	**#38**	**#41**	**#52**	**#53**	**#42**	**#43**	**#44**	**#51**	**#45**
Fuel	Distillate Oil											
Number of GTs Operating	2	1	2	2	2	2	2	2	2	2	2	2
GT Operating Load	BASE	BASE	75%	50%	BASE	75%	50%	BASE	BASE	BASE	75%	50%
Fuel Heating Value, Btu/lb (HHV)	19,398	19,398	19,398	19,398	19,398	19,398	19,398	19,398	19,398	19,398	19,398	19,398
Evaporative Cooler Status	Off	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off
Duct Burner Status	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
Chiller Status	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Ambient Relative Humidity, %	20	20	20	20	60	60	60	60	40	40	40	40
BAROMETRIC PRESSURE, psia	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
GT Heat Input (MMBtu/hr/unit, HHV)	2,524	2,524	2,022	1,555	2,389	1,891	1,459	2,227	2,217	2,068	1,664	1,293
DB Heat Input (MMBtu/hr/unit, HHV)	0	0	0	0	0	0	0	0	0	0	0	0
Net Power (kW)	716,117	351,779	565,752	412,348	691,128	544,157	395,427	635,396	622,185	577,681	455,598	328,366
Gross Power (kW)	725,936	356,270	574,551	420,076	702,281	554,034	404,064	646,841	633,588	588,788	465,751	337,499
Heat Rate (Btu/kW-hr, gross)	6,954	7,085	7,038	7,401	6,803	6,825	7,220	6,886	7,000	7,023	7,146	7,661
Heat Rate (Btu/kW-hr, net)	7,049	7,175	7,147	7,540	6,913	6,949	7,378	7,010	7,128	7,158	7,305	7,874
	18,290											
HRSG STACK EXHAUST GAS												
Exhaust Flow, lb/hr	4,989,600	4,989,600	4,000,500	3,223,500	4,838,400	3,810,500	2,937,900	4,546,500	4,529,700	4,249,400	3,398,900	2,703,800
Stack Temperature, °F	304.3	292.6	280.3	270.3	294.6	272.4	268.4	291.9	302.0	289.0	279.0	280.3
O_2, Vol. %	11.09%	12.17%	11.17%	11.72%	11.10%	11.16%	11.25%	10.90%	10.90%	11.03%	11.07%	11.40%
CO_2, Vol. %	5.66%	5.09%	5.66%	5.42%	5.50%	5.54%	5.55%	5.42%	5.42%	5.39%	5.44%	5.33%
H_2O, Vol. %	10.62%	9.17%	10.20%	9.14%	11.62%	11.06%	10.52%	13.08%	13.09%	12.63%	12.11%	11.28%
N_2, Vol. %	71.78%	72.70%	72.11%	72.85%	70.94%	71.39%	71.82%	69.77%	69.76%	70.11%	70.54%	71.14%
Ar, Vol. %	0.85%	0.87%	0.86%	0.87%	0.84%	0.85%	0.86%	0.83%	0.83%	0.84%	0.84%	0.85%
MW, lb/lb-mole	28.40	28.50	28.45	28.54	28.27	28.34	28.40	28.11	28.10	28.15	28.21	28.29
HRSG EXHAUST STACK EMISSIONS (PER S												
NOX, ppmvd @ 15% O2	5	5	5	5	5	5	5	5	5	5	5	5
NOX, lb/MMBtu as NO2 (EPA Method 19)	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194	0.0194
NOX, lb/hr as NO2	52.00	46.50	41.70	32.00	49.20	38.90	30.00	45.80	45.60	42.60	34.30	26.60
VOC, ppmvd @ 15% O2 as CH4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC, lb/MMBtu as CH4 (EPA Method 19)	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
VOC, lb/hr as CH4	6.19	6.19	4.95	3.98	6.03	4.74	3.64	5.70	5.68	5.32	4.24	3.37
CO, ppmvd @ 15% O2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO, lb/MMBtu (EPA Method 19)	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047	0.0047
CO, lb/hr	12.70	11.30	10.10	7.79	12.00	9.48	7.31	11.20	11.10	10.40	8.34	6.48
SO2, lb/hr	4.92	4.92	3.95	3.04	4.66	3.68	2.84	4.34	4.32	4.03	3.24	2.52
H2SO4, lb/hr	3.16	3.16	2.53	1.95	2.99	2.37	1.83	2.79	2.78	2.59	2.09	1.62
H2SO4, lb/MMBtu	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	0.00125	0.00126	0.00125
$PM/PM_{10}/PM_{2.5}$, lb/hr	42.60	42.60	42.00	41.60	42.40	41.90	41.50	42.30	42.20	42.10	41.70	41.30
$PM/PM_{10}/PM_{2.5}$, lb/MMBtu	0.0169	0.0169	0.0208	0.0268	0.0177	0.0222	0.0284	0.0190	0.0190	0.0204	0.0251	0.0319
NH_3, ppmvd @ 15% O2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH3, lb/MMBtu (EPA Method 19)	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072
NH_3, lb/hr	19.20	17.20	15.40	11.80	18.20	14.40	11.10	16.90	16.90	15.70	12.70	9.83
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	409,618	409,618	328,117	252,275	387,664	306,811	236,730	361,405	359,860	335,528	270,068	209,797
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	7.57	7.57	6.07	4.66	7.17	5.67	4.38	6.68	6.65	6.20	4.99	3.88
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	1.51	1.51	1.21	0.93	1.43	1.13	0.88	1.34	1.33	1.24	1.00	0.78
CO_2e, lb/hr (CH4 GWP = 25, N2O GWP = 298)	410,258	410,258	328,630	252,670	388,270	307,291	237,100	361,970	360,423	336,053	270,490	210,125
CO_2e, lb/MW-hr (gross)	1,130.3	1,151.5	1,144.0	1,203.0	1,105.7	1,109.3	1,173.6	1,119.2	1,137.7	1,141.5	1,161.5	1,245.2

Summary of Startup and Shutdown Emissions - 7HA.01 9/3/2014
CPV Towantic Energy, LLC

Startup/Shutdown Operating Data

hot starts/unit/gas	200	number/yr	1.00	hours/event	6	Avg. hours downtime	420	minutes/event
warm starts/unit/gas	0	number/yr	1.00	hours/event	30	Avg. hours downtime	1,860	minutes/event
cold starts/unit/gas	50	number/yr	1.00	hours/event	60	Avg. hours downtime	3,660	minutes/event
shutdowns/unit/gas	250	number/yr	1.00	hours/event	N/A	Avg. hours downtime	N/A	minutes/event
hot starts/unit/oil	0	number/yr	1.00	hours/event	6	Avg. hours downtime	420	minutes/event
warm starts/unit/oil	0	number/yr	1.00	hours/event	30	Avg. hours downtime	1,860	minutes/event
cold starts/unit/oil	0	number/yr	1.00	hours/event	60	Avg. hours downtime	3,660	minutes/event
shutdowns/unit/oil	0	number/yr	1.00	hours/event	N/A	Avg. hours downtime	N/A	minutes/event

Startup/Shutdown Emissions Self-Correcting Analysis

		Gas Start			Oil Start		
		NOx	**CO**	**VOC**	**NOx**	**CO**	**VOC**
Emissions per hot start	lbs	70.0	238.0	36.0	102.0	231.0	90.0
Emissions per warm start	lbs	93.0	242.0	37.0	104.0	230.0	87.0
Emissions per cold start	lbs	93.0	242.0	37.0	104.0	230.0	87.0
Emissions per shutdown	lbs	19.0	121.0	60.0	34.0	18.0	23.0
Shutdown/Hot start - duration (including downtime)	hrs	8.00	8.00	8.00	8.00	8.00	8.00
Shutdown/Warm start - duration (including downtime)	hrs	32.00	32.00	32.00	32.00	32.00	32.00
Shutdown/Cold start - duration (including downtime)	hrs	62.00	62.00	62.00	62.00	62.00	62.00
Shutdown/Hot start - avg hourly emissions[1]	lb/hr	11.13	44.88	12.00	12.75	28.88	11.25
Shutdown/Warm start - avg hourly emissions[1]	lb/hr	3.50	11.34	3.03	3.25	7.19	2.72
Shutdown/Cold start - avg hourly emissions[1]	lb/hr	1.81	5.85	1.56	1.68	3.71	1.40
Steady state average hourly (annual)[2]	lb/hr	21.61	7.98	4.17	21.61	7.98	4.17
Hot start - self correcting?	lb/hr	yes	no	no	yes	no	no
Warm start - self correcting?	lb/hr	yes	no	yes	yes	yes	yes
Cold start - self correcting?	lb/hr	yes	yes	yes	yes	yes	yes

[1] Includes balance of the hour at the steady state annual average hourly rate

[2] Based upon average annual hourly emissions with 3,000 hr/yr gas with duct firing, 720 hr/yr oil firing and gas without duct firing balance of the year

Startup/Shutdown Potential Emissions Increase (tpy/unit)

SUSD Type	Gas NOx	Gas CO	Gas VOC	Oil NOx	Oil CO	Oil VOC
Shutdown/Hot Start	-	29.52	6.27	-	0.00	0.00
Shutdown/Warm Start	-	0.00	-	-	-	-
Shutdown/Cold Start	-	-	-	-	-	-
TOTAL	**0.00**	**29.52**	**6.27**	**0.00**	**0.00**	**0.00**

Note: Maximum of hot start/warm start/transition used for worst case hot start

Operating Scenario	GE Case	Hours Per Year	Gross Generation Rate (kW/hr)	Heat Input HHV (MMBtu/hr)	Gross Generation Rate (MW/yr)	Heat Input HHV (MMBtu/yr)	Gross Heat Rate (Btu/kW-hr)	Net Heat Rate (Btu/kW-hr)
Gas No Duct Firing	Case #9	3,790	777,538	4,852	2,946,869	18,390,068	6,241	6,401
Gas With Duct Firing (ISO)	Case #35	4,250	804,949	5,072	3,421,033	21,557,876	6,302	6,463
Oil	Case #41	720	702,281	4,778	505,642	3,439,835	6,803	6,977
TOTAL (new & clean)		**8,760**	**---**	**---**	**6,873,545**	**43,387,779**	**6,312**	**6,474**
TOTAL (12.8% degradation margin)							**7,120**	**7,303**

Operating Scenario	GE Case	Hours Per Year	Gross Generation Rate (kW/hr)	CO_2e Emission Rate (lb/hr)	Gross Generation Rate (MW/yr)	CO_2e Emission Rate (tpy)	CO_2e Emission Rate Gross (lb/MW-hr)	CO_2e Emission Rate Net (lb/MW-hr)
Gas No Duct Firing	Case #9	3,790	777,538	577,312	2,946,869	1,094,007	742	762
Gas With Duct Firing (ISO)	Case #35	4,250	804,949	603,509	3,421,033	1,282,456	750	769
Oil	Case #41	720	702,281	776,541	505,642	279,555	1,106	1,134
TOTAL (new & clean)		**8,760**	**---**	**---**	**6,873,545**	**2,656,017**	**773**	**793**
TOTAL (12.8% degradation margin)							**872**	**894**

Emissions From Ancillary Equipment
CPV Towantic Energy, LLC

Emissions from Ancillary Equipment (tpy)

Pollutant	Auxiliary Boiler		Emergency Generator		Fire Pump	
	92.4	MMBtu/hr	2206	bhp	315	kW
NO_x	9	ppmvd @ 3% O_2	4.08	g/bhp	3.8	g/kW
	0.011	lb/MMBtu	1.37	lb/MMBtu	1.08	lb/MMBtu
	1.01	lb/hr	19.84	lb/hr	2.64	lb/hr
	2.02	TPY	2.98	TPY	0.40	TPY
CO	50	ppmvd @ 3% O_2	0.44	g/bhp	0.9	g/kW
	0.037	lb/MMBtu	0.15	lb/MMBtu	0.26	lb/MMBtu
	3.42	lb/hr	2.14	lb/hr	0.63	lb/hr
	6.83	TPY	0.32	TPY	0.094	TPY
VOC	9.6	ppmvd @ 3% O_2	0.11	g/bhp	0.1	g/kW
	0.0041	lb/MMBtu	0.004	lb/MMBtu	0.007	lb/MMBtu
	0.38	lb/hr	0.53	lb/hr	0.069	lb/hr
	0.75	TPY	0.08	TPY	0.010	TPY
$PM_{10}/PM_{2.5}$	N/A	ppmvd @ 3% O_2	0.03	g/bhp	0.13	g/kW
	0.007	lb/MMBtu	0.00003	lb/MMBtu	0.00023	lb/MMBtu
	0.65	lb/hr	0.15	lb/hr	0.09	lb/hr
	1.29	TPY	0.02	TPY	0.014	TPY
SO_2	0.0015	lb/MMBtu	0.0015	lb/MMBtu	0.0015	lb/MMBtu
	0.14	lb/hr	0.02	lb/hr	0.0037	lb/hr
	0.28	TPY	0.003	TPY	0.0006	TPY
H_2SO_4	0.00011	lb/MMBtu	0.00011	lb/MMBtu	0.00011	lb/MMBtu
	0.011	lb/hr	0.00166	lb/hr	0.00028	lb/hr
	0.02	TPY	0.0002	TPY	0.00004	TPY
Pb	4.9E-07	lb/MMBtu	7.7E-07	lb/MMBtu	7.7E-07	lb/MMBtu
	4.5E-05	lb/hr	1.1E-05	lb/hr	1.9E-06	lb/hr
	9.1E-05	TPY	1.7E-06	TPY	2.8E-07	TPY
CO_2	116.9	lb/MMBtu	163.1	lb/MMBtu	163.1	lb/MMBtu
	10,802	lb/hr	2,354	lb/hr	400	lb/hr
	21,605	TPY	353	TPY	60	TPY
CH_4	0.0022	lb/MMBtu	0.0066	lb/MMBtu	0.0066	lb/MMBtu
	0.2037	lb/hr	0.095	lb/hr	0.016	lb/hr
	0.41	TPY	0.0143	TPY	0.0024	TPY
N_2O	0.00022	lb/MMBtu	0.0013	lb/MMBtu	0.0013	lb/MMBtu
	0.0204	lb/hr	1.9E-02	lb/hr	0.00324135	lb/hr
	0.041	TPY	2.9E-03	TPY	4.9E-04	TPY
CO_2e	10,814	lb/hr	2,362	lb/hr	401	lb/hr
	21,627	TPY	354	TPY	60	TPY

NOTES:

Natural Gas SO2 emissions based upon a sulfur content of 0.5 gr/100 dscf
ULSD SO2 emissions based upon a sulfur content of 15 ppmw
Aux Boiler and Gas Heater criteria pollutant emission factors from BACT analysis
Emergency Generator criteria pollutant emission factors based on Tier 2 emission standards in 40 CFR 89.
Fire Pump criteria pollutant emission factors based on post -2009 emission standards in 40 CFR 60 Subpart IIII.
H2SO4 emissions assume a 5% conversion of SO2 --> SO3 (on a molar basis)
Fuel specific CO2, CH4 and N2O emission factors from 40 CFR 98, Subpart C
Pb emission factor for ULSD from AP-42 Section 3.1

Potential HAP Emissions (tpy)
CPV Towantic Energy, LLC

HAP	Potential Annual Emissions (tpy)					TOTALS
	CTGs	HRSGs	Auxiliary Boiler	Em. Generator	Fire Pump	
Organic Compounds						
Acetaldehyde	7.80E-01	0.00E+00	0	5.46E-05	2.82E-04	7.81E-01
Acrolein	1.25E-01	0.00E+00	0	1.71E-05	3.40E-05	1.25E-01
Benzene	3.29E-01	6.23E-04	3.88E-04	1.68E-03	3.43E-04	3.32E-01
1,3-Butadiene	3.59E-02	0.00E+00	0	0	1.44E-05	3.59E-02
Dichlorobenzene	0.00E+00	3.56E-04	2.22E-04	0	0	5.78E-04
Ethylbenzene	6.24E-01	0.00E+00	0	0	0	6.24E-01
Formaldehyde	2.67E+00	2.23E-02	1.37E-02	1.71E-04	4.34E-04	2.70E+00
Hexane	0.00E+00	5.34E-01	3.33E-01	0	0	8.67E-01
Propylene oxide	5.66E-01	0.00E+00	0	8.34E-03	1.31E-03	5.75E-01
Toluene	2.54E+00	1.01E-03	6.10E-04	6.08E-04	1.50E-04	2.54E+00
Xylene	1.25E+00	0.00E+00	0	4.18E-04	1.05E-04	1.25E+00
PAHs						
Acenaphthene	0	5.34E-07	3.33E-07	3.07E-06	5.22E-07	4.46E-06
Acenaphthylene	0	5.34E-07	4.44E-07	1.10E-04	1.86E-05	1.29E-04
Anthracene	0	7.12E-07	3.33E-07	4.05E-06	6.87E-07	5.78E-06
Benzo(a)anthracene	0	5.34E-07	3.33E-07	3.64E-06	6.17E-07	5.12E-06
Benzo(a)pyrene	0	3.56E-07	2.22E-07	4.07E-07	6.91E-08	1.05E-06
Benzo(b)fluoranthene	0	5.34E-07	3.33E-07	2.15E-07	3.64E-08	1.12E-06
Benzo(g,h,i)perylene	0	3.56E-07	2.22E-07	1.06E-06	1.80E-07	1.82E-06
Benzo(k)fluoranthene	0	5.34E-07	3.33E-07	3.36E-07	5.70E-08	1.26E-06
Chrysene	0	5.34E-07	3.33E-07	7.64E-07	1.30E-07	1.76E-06
Dibenz(a,h)anthracene	0	3.56E-07	2.22E-07	1.26E-06	2.14E-07	2.05E-06
7,12-Dimethylbenz(a) anthracene	0	4.75E-06	2.96E-06	0	0	7.71E-06
Fluoranthene	0	8.91E-07	5.36E-07	1.65E-05	2.80E-06	2.07E-05
Fluorene	0	8.31E-07	4.99E-07	6.32E-05	1.07E-05	7.53E-05
Indeno(1,2,3-cd)pyrene	0	5.34E-07	3.33E-07	8.12E-07	1.38E-07	1.82E-06
3-Methylchloranthrene	0	5.34E-07	3.33E-07	0	0	8.67E-07
2-Methylnaphthalene	0	7.12E-06	4.44E-06	0	0	1.16E-05
Naphthalene	8.56E-02	1.81E-04	1.15E-04	1.84E-04	3.12E-05	8.61E-02
Phenanthrene	0	5.05E-06	3.14E-06	6.37E-05	1.08E-05	8.27E-05
Pyrene	0	1.48E-06	9.06E-07	1.03E-05	1.76E-06	1.45E-05
TOTAL PAH	4.57E-02	2.07E-04	1.26E-04	3.64E-04	6.17E-05	4.64E-02
Metals						
Arsenic	7.07E-03	5.94E-05	3.70E-05	1.00E-07	1.70E-08	7.17E-03
Beryllium	7.67E-04	3.56E-06	2.22E-06	0.00E+00	0.00E+00	7.73E-04
Cadmium	2.97E-02	3.27E-04	2.03E-04	1.11E-08	1.89E-09	3.02E-02
Chromium	4.62E-02	4.16E-04	2.59E-04	2.68E-05	4.56E-06	4.69E-02

Potential HAP Emissions (tpy)
CPV Towantic Energy, LLC

HAP	Potential Annual Emissions (tpy)					TOTALS
	CTGs	HRSGs	Auxiliary Boiler	Em. Generator	Fire Pump	
Chromium VI	8.32E-03	7.48E-05	4.62E-05	4.85E-06	8.23E-07	8.45E-03
Cobalt	1.60E-03	2.43E-05	1.52E-05	0.00E+00	0.00E+00	1.64E-03
Lead	3.36E-02	1.45E-04	9.06E-05	1.67E-06	2.83E-07	3.39E-02
Manganese	1.37E+00	1.10E-04	6.84E-05	6.11E-07	1.04E-07	1.37E+00
Mercury	6.94E-03	7.42E-05	4.62E-05	2.23E-08	3.79E-09	7.06E-03
Nickel	4.89E-02	6.23E-04	3.88E-04	3.20E-06	5.44E-07	4.99E-02
Selenium	4.35E-02	7.12E-06	4.44E-06	5.54E-07	9.41E-08	4.35E-02
Max. Single HAP						**2.70**
Total All HAPs	**1.06E+01**	**5.61E-01**	**3.49E-01**	**1.21E-02**	**2.82E-03**	**11.56**

HAP Emission Factors
CPV Towantic Energy, LLC

HAP	CTG Emission Factors		
	CTG (gas)	CTG (oil)	HRSG
	lb/MMBtu	lb/MMBtu	lb/MMBtu
Organic Compounds			
Acetaldehyde	4.00E-05		
Acrolein	6.40E-06		
Benzene	1.20E-05	5.50E-05	2.10E-06
1,3-Butadiene	4.30E-07	1.60E-05	
Dichlorobenzene			1.20E-06
Ethylbenzene	3.20E-05		
Formaldehyde	1.12E-04	2.80E-04	7.50E-05
Hexane			1.80E-03
Propylene oxide	2.90E-05		
Toluene	1.30E-04		3.40E-06
Xylene	6.40E-05		
PAHs			
Acenaphthene			1.80E-09
Acenaphthylene			1.80E-09
Anthracene			2.40E-09
Benzo(a)anthracene			1.80E-09
Benzo(a)pyrene			1.20E-09
Benzo(b)fluoranthene			1.80E-09
Benzo(g,h,i)perylene			1.20E-09
Benzo(k)fluoranthene			1.80E-09
Chrysene			1.80E-09
Dibenz(a,h)anthracene			1.20E-09
7,12-Dimethylbenz(a) anthracene			1.60E-08
Fluoranthene			3.00E-09
Fluorene			2.80E-09
Indeno(1,2,3-cd)pyrene			1.80E-09
3-Methylchloranthrene			1.80E-09
2-Methylnaphthalene			2.40E-08
Naphthalene	1.30E-06	3.50E-05	6.10E-07
Phenanthrene			1.70E-08
Pyrene			5.00E-09
TOTAL PAH	2.20E-06	1.61E-06	6.98E-07
Metals			
Arsenic	2.00E-07	1.84E-06	2.00E-07
Beryllium	1.20E-08	3.10E-07	1.20E-08
Cadmium	1.10E-06	4.80E-06	1.10E-06
Chromium	1.40E-06	1.10E-05	1.40E-06

HAP Emission Factors
CPV Towantic Energy, LLC

HAP	CTG Emission Factors		
	CTG (gas)	CTG (oil)	HRSG
	lb/MMBtu	lb/MMBtu	lb/MMBtu
Chromium VI	2.52E-07	1.98E-06	2.52E-07
Cobalt	8.20E-08		8.20E-08
Lead	4.90E-07	1.40E-05	4.90E-07
Manganese	3.70E-07	7.90E-04	3.70E-07
Mercury	2.50E-07	1.20E-06	2.50E-07
Nickel	2.10E-06	4.60E-06	2.10E-06
Selenium	2.40E-08	2.50E-05	2.40E-08
Max. Single HAP			
Total All HAPs	**4.36E-04**	**1.24E-03**	**1.89E-03**

Notes:
1. Blank entry indicates no emission factor reported in the reference cited.
2. Organic HAP emission factors for CTGs are from Tables 3.1-3 and 3.1.4 of AP-42 except gas-firing for formaldehyde which is based on the California Air Resources Board air toxics emission factor database. Metal HAP emission factors for gas firing are from AP-42 Table 1.4-4, for oil firing from AP-42 Table 3.1-5 except for arsenic which is based on the California Air Resources Board air toxics emission factor database.
3. Emission factors for the HRSG and auxiliary boiler are from AP-42 Tables 1.4-3 and 1.4-4.
4. Emission factors for organics from the emergency diesel generator are from AP-42 Tables 3.4-3 and 3.4-4, for the fire pump from AP-42 Table 3.3-2.
5. Metal emission factors for the emergency generator and fire pump are based on the paper “Survey of Ultra-Trace Metals in Gas Turbine Fuels”, 11th Annual International Petroleum Conference, Oct 12-15, 2004. Where trace metals were detected in any of 13 samples, the average result is used. Where no metals were detected in any of 13 samples, the detection limit was used.
6. Hexavalent chrome is based on 18% of the total chrome emissions per EPA 453/R-98-004a.

Potential Ancillary Source HAP Emissions (lb/hr)
CPV Towantic Energy, LLC

HAP	Auxiliary Boiler		Em. Generator		Fire Pump	
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr
Organic Compounds						
Acetaldehyde		0.00E+00	2.52E-05	3.64E-04	7.67E-04	1.88E-03
Acrolein		0.00E+00	7.88E-06	1.14E-04	9.25E-05	2.27E-04
Benzene	2.10E-06	1.94E-04	7.76E-04	1.12E-02	9.33E-04	2.29E-03
1,3-Butadiene		0.00E+00		0.00E+00	3.91E-05	9.58E-05
Dichlorobenzene	1.20E-06	1.11E-04		0.00E+00		0.00E+00
Ethylbenzene		0.00E+00		0.00E+00		0.00E+00
Formaldehyde	7.40E-05	6.84E-03	7.89E-05	1.14E-03	1.18E-03	2.89E-03
Hexane	1.80E-03	1.66E-01		0.00E+00		0.00E+00
Propylene oxide		0.00E+00	3.85E-03	5.56E-02	3.56E-03	8.72E-03
Toluene	3.30E-06	3.05E-04	2.81E-04	4.06E-03	4.09E-04	1.00E-03
Xylene		0.00E+00	1.93E-04	2.79E-03	2.85E-04	6.98E-04
PAHs						
Acenaphthene	1.80E-09	1.66E-07	1.42E-06	2.05E-05	1.42E-06	3.48E-06
Acenaphthylene	2.40E-09	2.22E-07	5.06E-05	7.30E-04	5.06E-05	1.24E-04
Anthracene	1.80E-09	1.66E-07	1.87E-06	2.70E-05	1.87E-06	4.58E-06
Benzo(a)anthracene	1.80E-09	1.66E-07	1.68E-06	2.43E-05	1.68E-06	4.12E-06
Benzo(a)pyrene	1.20E-09	1.11E-07	1.88E-07	2.71E-06	1.88E-07	4.61E-07
Benzo(b)fluoranthene	1.80E-09	1.66E-07	9.91E-08	1.43E-06	9.91E-08	2.43E-07
Benzo(g,h,i)perylene	1.20E-09	1.11E-07	4.89E-07	7.06E-06	4.89E-07	1.20E-06
Benzo(k)fluoranthene	1.80E-09	1.66E-07	1.55E-07	2.24E-06	1.55E-07	3.80E-07
Chrysene	1.80E-09	1.66E-07	3.53E-07	5.10E-06	3.53E-07	8.65E-07
Dibenz(a,h)anthracene	1.20E-09	1.11E-07	5.83E-07	8.42E-06	5.83E-07	1.43E-06
7,12-Dimethylbenz(a) anthracene	1.60E-08	1.48E-06		0.00E+00		0.00E+00
Fluoranthene	2.90E-09	2.68E-07	7.61E-06	1.10E-04	7.61E-06	1.86E-05
Fluorene	2.70E-09	2.49E-07	2.92E-05	4.21E-04	2.92E-05	7.15E-05
Indeno(1,2,3-cd)pyrene	1.80E-09	1.66E-07	3.75E-07	5.41E-06	3.75E-07	9.19E-07
3-Methylchloranthrene	1.80E-09	1.66E-07		0.00E+00		0.00E+00
2-Methylnaphthalene	2.40E-08	2.22E-06		0.00E+00		0.00E+00
Naphthalene	6.20E-07	5.73E-05	8.48E-05	1.22E-03	8.48E-05	2.08E-04
Phenanthrene	1.70E-08	1.57E-06	2.94E-05	4.24E-04	2.94E-05	7.20E-05
Pyrene	4.90E-09	4.53E-07	4.78E-06	6.90E-05	4.78E-06	1.17E-05
TOTAL PAH	6.80E-07	6.28E-05	1.68E-04	2.43E-03	1.68E-04	4.12E-04
Metals						
Arsenic	2.00E-07	1.85E-05	4.62E-08	6.67E-07	4.62E-08	1.13E-07
Beryllium	1.20E-08	1.11E-06		0.00E+00		0.00E+00
Cadmium	1.10E-06	1.02E-04	5.13E-09	7.41E-08	5.13E-09	1.26E-08

Potential Ancillary Source HAP Emissions (lb/hr)
CPV Towantic Energy, LLC

HAP	Auxiliary Boiler		Em. Generator		Fire Pump	
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr
Chromium	1.40E-06	1.29E-04	1.24E-05	1.79E-04	1.24E-05	3.04E-05
Chromium VI	2.50E-07	2.31E-05	2.24E-06	3.23E-05	2.24E-06	5.49E-06
Cobalt	8.20E-08	7.58E-06		0.00E+00		0.00E+00
Lead	4.90E-07	4.53E-05	7.69E-07	1.11E-05	7.69E-07	1.88E-06
Manganese	3.70E-07	3.42E-05	2.82E-07	4.07E-06	2.82E-07	6.91E-07
Mercury	2.50E-07	2.31E-05	1.03E-08	1.49E-07	1.03E-08	2.52E-08
Nickel	2.10E-06	1.94E-04	1.48E-06	2.14E-05	1.48E-06	3.63E-06
Selenium	2.40E-08	2.22E-06	2.56E-07	3.70E-06	2.56E-07	6.27E-07
Max. Single HAP						
Total All HAPs	**1.89E-03**	**1.74E-01**	**5.61E-03**	**8.10E-02**	**7.66E-03**	**1.88E-02**

Potential HAP Emissions (lb/hr/unit) - 7HA01
CPV Towantic Energy, LLC

AMBIENT CONDITIONS:	-14.2°F						59°F					90°F		100°F					
GE CASE #:	#1	#2	#3	#4	#28	#29	#35	#9	#31	#32	#11	#36	#13	#14	#16	#17	#23	#24	#22
Fuel	Natural Gas																		
Number of GTs Operating	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
GT Heat Input (MMBtu/hr/unit, HHV	2,526	2,526	2,526	2,526	2,047	1,582	2,426	2,426	2,017	1,538	555	2,213	2,303	2,297	2,297	2,297	1,686	1,308	1,170
DB Heat Input (MMBtu/hr/unit, HHV)	198	97	962	0	0	0	110	0	0	0	0	209	0	190	766	0	0	0	0
HAP																			
Organic Compounds																			
Acetaldehyde	1.011E-01	1.011E-01	1.011E-01	1.011E-01	8.188E-02	6.328E-02	9.705E-02	9.705E-02	8.066E-02	6.150E-02	2.221E-02	8.853E-02	9.214E-02	9.187E-02	9.187E-02	9.187E-02	6.742E-02	5.232E-02	4.680E-02
Acrolein	1.617E-02	1.617E-02	1.617E-02	1.617E-02	1.310E-02	1.012E-02	1.553E-02	1.553E-02	1.291E-02	9.841E-03	3.554E-03	1.416E-02	1.474E-02	1.470E-02	1.470E-02	1.470E-02	1.079E-02	8.371E-03	7.489E-03
Benzene	3.073E-02	3.052E-02	3.234E-02	3.032E-02	2.456E-02	1.898E-02	2.934E-02	2.911E-02	2.420E-02	1.845E-02	6.663E-03	2.700E-02	2.764E-02	2.796E-02	2.917E-02	2.756E-02	2.023E-02	1.569E-02	1.404E-02
1,3-Butadiene	1.086E-03	1.086E-03	1.086E-03	1.086E-03	8.802E-04	6.802E-04	1.043E-03	1.043E-03	8.671E-04	6.612E-04	2.388E-04	9.517E-04	9.905E-04	9.876E-04	9.876E-04	9.876E-04	7.248E-04	5.624E-04	5.031E-04
Dichlorobenzene	2.375E-04	1.161E-04	1.155E-03	0.000E+00	0.000E+00	0.000E+00	1.321E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.503E-04	0.000E+00	2.277E-04	9.192E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ethylbenzene	8.084E-02	8.084E-02	8.084E-02	8.084E-02	6.551E-02	5.062E-02	7.764E-02	7.764E-02	6.453E-02	4.920E-02	1.777E-02	7.082E-02	7.371E-02	7.349E-02	7.349E-02	7.349E-02	5.394E-02	4.185E-02	3.744E-02
Formaldehyde	2.978E-01	2.902E-01	3.551E-01	2.830E-01	2.293E-01	1.772E-01	2.800E-01	2.717E-01	2.259E-01	1.722E-01	6.219E-02	2.635E-01	2.580E-01	2.715E-01	3.147E-01	2.572E-01	1.888E-01	1.465E-01	1.310E-01
Hexane	3.562E-01	1.742E-01	1.732E+00	0.000E+00	0.000E+00	0.000E+00	1.982E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-01	0.000E+00	3.416E-01	1.379E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Propylene oxide	7.326E-02	7.326E-02	7.326E-02	7.326E-02	5.936E-02	4.588E-02	7.036E-02	7.036E-02	5.848E-02	4.459E-02	1.610E-02	6.418E-02	6.680E-02	6.660E-02	6.660E-02	6.660E-02	4.888E-02	3.793E-02	3.393E-02
Toluene	3.291E-01	3.288E-01	3.317E-01	3.284E-01	2.661E-01	2.056E-01	3.158E-01	3.154E-01	2.622E-01	1.999E-01	7.218E-02	2.884E-01	2.994E-01	2.992E-01	3.012E-01	2.986E-01	2.191E-01	1.700E-01	1.521E-01
Xylene	1.617E-01	1.617E-01	1.617E-01	1.617E-01	1.310E-01	1.012E-01	1.553E-01	1.553E-01	1.291E-01	9.841E-02	3.554E-02	1.416E-01	1.474E-01	1.470E-01	1.470E-01	1.470E-01	1.079E-01	8.371E-02	7.489E-02
PAHs	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acenaphthene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acenaphthylene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Anthracene	4.750E-07	2.323E-07	2.309E-06	0.000E+00	0.000E+00	0.000E+00	2.642E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.006E-07	0.000E+00	4.555E-07	1.838E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(a)anthracene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(a)pyrene	2.375E-07	1.161E-07	1.155E-06	0.000E+00	0.000E+00	0.000E+00	1.321E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.503E-07	0.000E+00	2.277E-07	9.192E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(b)fluoranthene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(g,h,i)perylene	2.375E-07	1.161E-07	1.155E-06	0.000E+00	0.000E+00	0.000E+00	1.321E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.503E-07	0.000E+00	2.277E-07	9.192E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(k)fluoranthene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Chrysene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Dibenz(a,h)anthracene	2.375E-07	1.161E-07	1.155E-06	0.000E+00	0.000E+00	0.000E+00	1.321E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.503E-07	0.000E+00	2.277E-07	9.192E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7,12-Dimethylbenz(a) anthracene	3.166E-06	1.549E-06	1.539E-05	0.000E+00	0.000E+00	0.000E+00	1.761E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.337E-06	0.000E+00	3.036E-06	1.226E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fluoranthene	5.937E-07	2.904E-07	2.886E-06	0.000E+00	0.000E+00	0.000E+00	3.303E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.257E-07	0.000E+00	5.693E-07	2.298E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fluorene	5.541E-07	2.710E-07	2.694E-06	0.000E+00	0.000E+00	0.000E+00	3.083E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.840E-07	0.000E+00	5.314E-07	2.145E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Indeno(1,2,3-cd)pyrene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3-Methylchloranthrene	3.562E-07	1.742E-07	1.732E-06	0.000E+00	0.000E+00	0.000E+00	1.982E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.754E-07	0.000E+00	3.416E-07	1.379E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2-Methylnaphthalene	4.750E-06	2.323E-06	2.309E-05	0.000E+00	0.000E+00	0.000E+00	2.642E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	5.006E-06	0.000E+00	4.555E-06	1.838E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Naphthalene	3.405E-03	3.343E-03	3.871E-03	3.284E-03	2.661E-03	2.056E-03	3.221E-03	3.154E-03	2.622E-03	1.999E-03	7.218E-04	3.004E-03	2.994E-03	3.101E-03	3.453E-03	2.986E-03	2.191E-03	1.700E-03	1.521E-03
Phenanthrene	3.364E-06	1.645E-06	1.636E-05	0.000E+00	0.000E+00	0.000E+00	1.872E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.546E-06	0.000E+00	3.226E-06	1.302E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pyrene	9.895E-07	4.839E-07	4.811E-06	0.000E+00	0.000E+00	0.000E+00	5.505E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.043E-06	0.000E+00	9.489E-07	3.830E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL PAH	5.696E-03	5.626E-03	6.230E-03	5.558E-03	4.504E-03	3.480E-03	5.414E-03	5.337E-03	4.437E-03	3.383E-03	1.222E-03	5.015E-03	5.067E-03	5.185E-03	5.587E-03	5.053E-03	3.708E-03	2.877E-03	2.574E-03
Metals	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Arsenic	5.448E-04	5.246E-04	6.977E-04	5.053E-04	4.094E-04	3.164E-04	5.072E-04	4.852E-04	4.033E-04	3.075E-04	1.110E-04	4.844E-04	4.607E-04	4.973E-04	6.125E-04	4.593E-04	3.371E-04	2.616E-04	2.340E-04
Beryllium	3.269E-05	3.148E-05	4.186E-05	3.032E-05	2.456E-05	1.898E-05	3.043E-05	2.911E-05	2.420E-05	1.845E-05	6.663E-06	2.906E-05	2.764E-05	2.984E-05	3.675E-05	2.756E-05	2.023E-05	1.569E-05	1.404E-05
Cadmium	2.997E-03	2.885E-03	3.837E-03	2.779E-03	2.252E-03	1.740E-03	2.790E-03	2.669E-03	2.218E-03	1.691E-03	6.108E-04	2.664E-03	2.534E-03	2.735E-03	3.369E-03	2.526E-03	1.854E-03	1.439E-03	1.287E-03
Chromium	3.814E-03	3.672E-03	4.884E-03	3.537E-03	2.866E-03	2.215E-03	3.551E-03	3.397E-03	2.823E-03	2.153E-03	7.773E-04	3.391E-03	3.225E-03	3.481E-03	4.288E-03	3.215E-03	2.360E-03	1.831E-03	1.638E-03
Chromium VI	6.865E-04	6.610E-04	8.791E-04	6.366E-04	5.159E-04	3.986E-04	6.391E-04	6.114E-04	5.082E-04	3.875E-04	1.399E-04	6.103E-04	5.805E-04	6.266E-04	7.718E-04	5.788E-04	4.247E-04	3.296E-04	2.949E-04
Cobalt	2.234E-04	2.151E-04	2.861E-04	2.072E-04	1.679E-04	1.297E-04	2.080E-04	1.989E-04	1.654E-04	1.261E-04	4.553E-05	1.986E-04	1.889E-04	2.039E-04	2.511E-04	1.883E-04	1.382E-04	1.072E-04	9.595E-05
Lead	1.335E-03	1.285E-03	1.709E-03	1.238E-03	1.003E-03	7.751E-04	1.243E-03	1.189E-03	9.881E-04	7.534E-04	2.721E-04	1.187E-03	1.129E-03	1.218E-03	1.501E-03	1.125E-03	8.259E-04	6.409E-04	5.733E-04
Manganese	1.008E-03	9.706E-04	1.291E-03	9.347E-04	7.574E-04	5.853E-04	9.384E-04	8.977E-04	7.461E-04	5.689E-04	2.054E-04	8.961E-04	8.523E-04	9.200E-04	1.133E-03	8.498E-04	6.236E-04	4.839E-04	4.329E-04
Mercury	6.811E-04	6.558E-04	8.721E-04	6.316E-04	5.118E-04	3.955E-04	6.341E-04	6.065E-04	5.042E-04	3.844E-04	1.388E-04	6.054E-04	5.758E-04	6.216E-04	7.657E-04	5.742E-04	4.214E-04	3.270E-04	2.925E-04
Nickel	5.721E-03	5.509E-03	7.326E-03	5.305E-03	4.299E-03	3.322E-03	5.326E-03	5.095E-03	4.235E-03	3.229E-03	1.166E-03	5.086E-03	4.837E-03	5.222E-03	6.432E-03	4.823E-03	3.540E-03	2.747E-03	2.457E-03
Selenium	6.538E-05	6.296E-05	8.372E-05	6.063E-05	4.913E-05	3.797E-05	6.087E-05	5.823E-05	4.840E-05	3.690E-05	1.333E-05	5.812E-05	5.528E-05	5.967E-05	7.350E-05	5.512E-05	4.045E-05	3.139E-05	2.808E-05

Potential HAP Emissions
CPV Towantic Energy, LL

AMBIENT CONDITIONS:	-14.2F				59°F			90°F	100°F			
GE CASE #:	#37	#46	#47	#38	#41	#52	#53	#42	#43	#44	#51	#45
Fuel	Distillate Oil											
Number of GTs Operating	2	1	2	2	2	2	2	2	2	1	2	2
GT Heat Input (MMBtu/hr/unit, HHV	2,524	2,524	2,022	1,555	2,389	1,891	1,459	2,227	2,217	2,068	1,664	1,293
DB Heat Input (MMBtu/hr/unit, HHV)	0	0	0	0	0	0	0	0	0	0	0	0
HAP												
Organic Compounds												
Acetaldehyde	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acrolein	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzene	1.388E-01	1.388E-01	1.112E-01	8.550E-02	1.314E-01	1.040E-01	8.023E-02	1.225E-01	1.220E-01	1.137E-01	9.153E-02	7.110E-02
1,3-Butadiene	4.038E-02	4.038E-02	3.235E-02	2.487E-02	3.822E-02	3.025E-02	2.334E-02	3.563E-02	3.548E-02	3.308E-02	2.663E-02	2.068E-02
Dichlorobenzene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ethylbenzene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Formaldehyde	7.067E-01	7.067E-01	5.661E-01	4.353E-01	6.689E-01	5.294E-01	4.084E-01	6.236E-01	6.209E-01	5.789E-01	4.660E-01	3.620E-01
Hexane	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Propylene oxide	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Toluene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Xylene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PAHs	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acenaphthene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Acenaphthylene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Anthracene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(a)anthracene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(a)pyrene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(b)fluoranthene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(g,h,i)perylene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Benzo(k)fluoranthene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Chrysene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Dibenz(a,h)anthracene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7,12-Dimethylbenz(a) anthracene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fluoranthene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Fluorene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Indeno(1,2,3-cd)pyrene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3-Methylchloranthrene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2-Methylnaphthalene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Naphthalene	8.834E-02	8.834E-02	7.076E-02	5.441E-02	8.361E-02	6.617E-02	5.106E-02	7.794E-02	7.761E-02	7.236E-02	5.825E-02	4.525E-02
Phenanthrene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pyrene	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL PAH	4.053E-03	4.053E-03	3.246E-03	2.496E-03	3.836E-03	3.036E-03	2.342E-03	3.576E-03	3.561E-03	3.320E-03	2.672E-03	2.076E-03
Metals	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Arsenic	4.649E-03	4.649E-03	3.724E-03	2.863E-03	4.399E-03	3.482E-03	2.687E-03	4.101E-03	4.084E-03	3.808E-03	3.065E-03	2.381E-03
Beryllium	7.825E-04	7.825E-04	6.268E-04	4.819E-04	7.405E-04	5.861E-04	4.522E-04	6.904E-04	6.874E-04	6.409E-04	5.159E-04	4.008E-04
Cadmium	1.212E-02	1.212E-02	9.705E-03	7.462E-03	1.147E-02	9.075E-03	7.002E-03	1.069E-02	1.064E-02	9.924E-03	7.988E-03	6.205E-03
Chromium	2.776E-02	2.776E-02	2.224E-02	1.710E-02	2.628E-02	2.080E-02	1.605E-02	2.450E-02	2.439E-02	2.274E-02	1.831E-02	1.422E-02
Chromium VI	4.998E-03	4.998E-03	4.003E-03	3.078E-03	4.730E-03	3.743E-03	2.888E-03	4.409E-03	4.391E-03	4.094E-03	3.295E-03	2.560E-03
Cobalt	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Lead	3.534E-02	3.534E-02	2.831E-02	2.176E-02	3.344E-02	2.647E-02	2.042E-02	3.118E-02	3.104E-02	2.895E-02	2.330E-02	1.810E-02
Manganese	1.994E+00	1.994E+00	1.597E+00	1.228E+00	1.887E+00	1.494E+00	1.152E+00	1.759E+00	1.752E+00	1.633E+00	1.315E+00	1.021E+00
Mercury	3.029E-03	3.029E-03	2.426E-03	1.865E-03	2.867E-03	2.269E-03	1.750E-03	2.672E-03	2.661E-03	2.481E-03	1.997E-03	1.551E-03
Nickel	1.161E-02	1.161E-02	9.301E-03	7.151E-03	1.099E-02	8.697E-03	6.710E-03	1.024E-02	1.020E-02	9.511E-03	7.655E-03	5.947E-03
Selenium	6.310E-02	6.310E-02	5.055E-02	3.886E-02	5.972E-02	4.726E-02	3.647E-02	5.567E-02	5.544E-02	5.169E-02	4.160E-02	3.232E-02

Summary of Estimated Fugitive GHG Emissions
CPV Towantic Energy, LLC

Circuit Breaker SF6 Emissions

SF6 Storage Capacity	111	lbs
SF6 Leak Rate	1.0%	per year
SF6 emissions	1.11	lbs/year
GHG emissions (CO2e)	**12.7**	**tons per year**

Natural Gas Handling Fugitive Emissions

Component Type	Component Count	Emission factor (scfh/component)[1]	CH4 Emissions (tpy)[2]	GHG Emissions (tpy)
Connector	10	1.69	3.08	77.04
Flanges, Regulator, Other	10	0.772	1.41	35.19
Control Valves	10	9.34	17.03	425.76
Orifice Meter	3	0.212	0.12	2.90
TOTALS			**21.64**	**540.9**

[1] Emission factors are from 40 CFR 98, Subpart W, Table W-7

[2] Conservatively assumes 100% CH4

Summary of Baseline Emissions
CPV Towantic Energy, LLC

SUMMARY OF BASELINE EMISSION RATES AND REDUCTIONS

Pollutant	Combustion Turbines #1 and #2[1]				Auxiliary Boiler			
	Baseline Emission Rate (lb/MMBtu)[2]	Baseline (tpy)[3]	BACT (tpy)[4]	Reduction (tpy)	Baseline Emission Rate (lb/MMBtu)[5]	Baseline (tpy)[6]	BACT (tpy)[7]	Reduction (tpy)
NO_x	0.32	3400	94.7	3306	0.10	18.5	2.0	16.5
CO	0.082	871.4	35.0	836.4	0.084	15.5	6.8	8.7
VOC	0.0021	22.3	18.2	4.1	0.0055	1.02	0.75	0.3
GHGs[8]	119	2,032,758	1,328,009	704,749	N/A	N/A	N/A	N/A

[1] Emissions presented are on a per turbine basis

[2] From AP-42 Section 3.1 for uncontrolled natural gas fired combustion turbines except for GHGs

[3] Based upon the rated heat input of the combustion turbine firing gas at 59F of 2,426 MMBtu/hr for 8,760 hr/yr

[4] Proposed ton per year emissions excluding contribution from startup and shutdown emissions.

[5] From AP-42 Section 1.4 for uncontrolled natural gas fired boilers <100 MMBtu/hr.

[6] Based upon the rated heat input of the auxiliary boiler of 92.4MMBtu/hr for 4,000 hr/yr

[7] Proposed ton per year emissions.

[8] Baseline based upon conventional steam generation with a heat rate of 10,000 Btu/kWh for 390MW firing gas

Pipeline Costs for Carbon Transport
CPV Towantic Energy, LLC

Diameter	16	inches
Miles	100	miles
Materials	$24,703,945	$\$70,350 + \$2.01 \times L \times (330.5 \times D^2 + 686.7 \times D + 26,960)$
Labor	$58,874,146	$\$371,850 + \$2.01 \times L \times (343.2 \times D^2 + 2,074 \times D + 170,013)$
Misc	$22,142,680	$\$147,250 + \$1.55 \times L \times (8,417 \times D + 7,234)$
Right of Way	$5,045,760	$\$51,200 + \$1.28 \times L \times (577 \times D + 29,788)$
Surge Tank	$1,244,724	Fixed cost = $1,244,724
Control System	$111,907	Fixed cost = $111,907
TOTAL	$112,123,162	

Source: National Energy Technology Lab report "Carbon Dioxide Transport and Storage Costs in NETL Studies" (March 2013)

Combustion Turbine Maximum HAP Emission Rates for MASC - 7HA.01

CPV Towantic Energy, LLC

HAP	Emission Factors			Emission Rates	
	CTG - Gas Firing	CTG - Oil Firing	Duct Burners	Gas Firing	Oil Firing
	lb/MMBtu	lb/MMBtu	lb/MMBtu	lb/hr	lb/hr
Organic Compounds					
Acetaldehyde	4.00E-05		4.00E-05	1.09E-01	0.00E+00
Acrolein	6.40E-06		6.40E-06	1.74E-02	0.00E+00
Benzene	1.20E-05	5.50E-05	1.20E-05	3.27E-02	1.39E-01
1,3-Butadiene	4.30E-07	1.60E-05	4.30E-07	1.17E-03	4.04E-02
Dichlorobenzene				0	0
Ethylbenzene	3.20E-05		3.20E-05	8.72E-02	0.00E+00
Formaldehyde	1.10E-04	2.80E-04	3.50E-04	3.47E-01	7.07E-01
Hexane				0	0
Propylene oxide	2.90E-05		2.90E-05	7.90E-02	0.00E+00
Toluene	1.30E-04		1.30E-04	3.54E-01	0.00E+00
Xylene	6.40E-05		6.40E-05	1.74E-01	0.00E+00
Naphthalene	1.30E-06	3.50E-05	1.30E-06	3.54E-03	8.83E-02
Metals					
Arsenic	2.00E-07	1.84E-06	2.00E-07	5.45E-04	4.65E-03
Beryllium	1.20E-08	3.10E-07	1.20E-08	3.27E-05	7.82E-04
Cadmium	1.10E-06	4.80E-06	1.10E-06	3.00E-03	1.21E-02
Chromium	1.40E-06	1.10E-05	1.40E-06	3.81E-03	2.78E-02
Chromium VI	2.50E-07		2.50E-07	6.81E-04	0.00E+00
Cobalt	8.20E-08		8.20E-08	2.23E-04	0.00E+00
Lead	4.90E-07	1.40E-05	4.90E-07	1.33E-03	3.53E-02
Manganese	3.70E-07	7.90E-04	3.70E-07	1.01E-03	1.99E+00
Mercury	2.50E-07	1.20E-06	2.50E-07	6.81E-04	3.03E-03
Nickel	2.10E-06	4.60E-06	2.10E-06	5.72E-03	1.16E-02
Selenium	2.40E-08	2.50E-05	2.40E-08	6.54E-05	6.31E-02

APPENDIX B – VENDOR SUPPLIED EMISSIONS DATA

SIZE	DWG NO	SH	REV
A	240A2083	1	F

THIS DOCUMENT SHALL BE REVISED IN ITS ENTIRETY ALL SHEETS OF THIS DOCUMENT ARE THE SAME REVISION LEVEL AS INDICATED IN THE REVISION BLOCK

REVISIONS

REV	DESCRIPTION	DATE (dd-mmm-yyyy)	APPROVED
-	Preliminary Issue	17-Mar-2014	P. Kulkarni
A	Preliminary Issue	17-Apr-2014	P. Kulkarni
B	Preliminary Issue	28-Apr-2014	P. Kulkarni
C	Preliminary Issue	01-May-2014	P. Kulkarni
D	Preliminary Issue	19-Jun-2014	P. Kulkarni
E	Preliminary Issue	08-Jul-2014	P. Kulkarni
F	Preliminary Issue	25-Aug-2014	P. Kulkarni

Combined Cycle Systems

Combined Cycle Systems Emissions Estimates

2x1 7HA.01 ST-D602 40LSB ACC

SIGNATURES		DATE (dd-mmm-yyyy)
PREPARED BY	A. Kos	17-Mar-2014
ENVIRONMENTAL	H. Xu	17-Mar-2014
PROJECT ENGINEER		
ISSUED		

GE Energy

GENERAL ELECTRIC COMPANY
GENERAL ELECTRIC INTERNATIONAL, INC.
POWER PLANT SYSTEMS

CPV Towantic

MADE FOR: IPS # 974919 | MDL - T218

FIRST MADE FOR: Competitive Power Ventures, Inc. (CPV)	SIZE **A**	CAGE CODE **NONE**	DWG NO **240A2083**
	SCALE **NONE**	PA#	SHEET 1 of 11

Drawing Revision Status

Revision	Date	Description
-	17-Mar-2014	Draft
A	17-Apr-2014	Added cases with GT using liquid fuel
B	28-Apr-2014	Added cases based on customer's request
C	01-May-2014	Added 2 additional cases based on customer's request, NOx for DO set at
D	19-Jun-2014	Added 4 cases for NG (20, 50, 59, 90F; fully fired to ST limits) Updated Distillate performance based on updated cycle deck
E	08-Jul-2014	HB's# 1, 33, 34 and 35 changed such that ST output ~280MW by reducing the amount of duct firing (as per direction from CPV)
F	25-Aug-2014	Updated Stack VOC Concentrations

OPERATING POINT		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Case Description		21% DB Firing	10% DB Firing	100% DB Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	19% DB Firing	Unfired	20% DB Firing	10% DB Firing	80% DB Firing
SITE CONDITIONS																	
Ambient Temperature	°F	-14.2	-14.2	-14.2	-14.2	-14.2	20	50	50	59	59	59	90	90	100	100	100
Ambient Pressure	psia	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Ambient Relative Humidity	%	20	20	20	20	20	60	60	60	60	60	60	60	60	40	40	40
PLANT STATUS																	
HRSG Duct Burner		Fired	Fired	Fired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Fired	Unfired	Fired	Fired	Fired
SCR		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
CO Catalyst		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Evaporative Cooler state (On or Off)		Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On
Gas Turbine Load	%	BASE	BASE	BASE	BASE	47%	BASE	BASE	96%	BASE	97%	30%	BASE	BASE	BASE	BASE	BASE
Gas Turbines Operating		2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1
GT Diluent Injection Type		None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
GT Diluent Injection Flow (per GT)	10^3 lb/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FUEL DATA																	
Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
HHV	**BTU/lb**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**
LHV	**BTU/lb**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**
Fuel Mol. Wt.	**lb/mole**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**
Fuel Bound Nitrogen	Wt %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Sulfur Content	grains/100 SCF @ 60°F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

HRSG DATA (PER UNIT)

HRSG EXIT EXHAUST GAS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Composition:																	
Ar	mol %	0.8873	0.8887	0.8768	0.8901	0.8901	0.8900	0.8900	0.8900	0.8800	0.8801	0.8901	0.8572	0.8600	0.8570	0.8584	0.8483
CO2	mol %	4.3607	4.2075	5.5031	4.0604	3.8504	4.1100	4.1400	4.1200	4.1300	4.1104	3.5804	4.4363	4.1200	4.4450	4.2855	5.4198
H2O	mol %	8.4465	8.1478	10.6753	7.8608	7.4607	8.1600	8.7300	8.7000	8.9900	8.9609	7.9308	11.7666	11.1600	11.8129	11.5070	13.6822
N2	mol %	74.7564	74.8743	73.8772	74.9875	75.1475	74.7900	74.3700	74.3800	74.1600	74.1774	74.5775	72.2247	72.4600	72.1908	72.3094	71.4659
O2	mol %	11.5491	11.8817	9.0676	12.2012	12.6513	12.0500	11.8700	11.9100	11.8400	11.8712	13.0213	10.7152	11.4000	10.6943	11.0397	8.5837
Molecular weight		28.4329	28.4517	28.2927	28.4698	28.4941	28.4417	28.3824	28.3838	28.3524	28.3534	28.4186	28.0762	28.1139	28.0722	28.0912	27.9560
Temperature	°F	182	189	170	196	179	190	185	184	183	182	170	190	196	197	200	170
Mass Flow	lb/hr	5021800	5017200	5057000	5012700	3151100	4923500	4725000	4571700	4647300	4545500	2460200	4395400	4386900	4385100	4380800	4411700
Actual Volume Flow	Actual ft3/hr	85039000	85830000	84463000	86691000	52979000	84426000	80592000	77841000	79080000	77212000	40908000	76329000	76805000	77005000	77159000	74572000
HRSG EXIT EXHAUST GAS EMISSIONS																	
NOx	ppmvd @ 15% O2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NOx	lb/hr as NO2	20.9	20.1	26.8	19.4	11.5	19.3	18.7	18	18.4	17.9	8.4	18.9	17.4	18.8	18.1	23.3
CO	ppmvd @ 15% O2	1.7	1.7	1.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.7	0.9	1.7	1.7	1.7
CO	lb/hr	10.8	10.4	13.8	5.31	3.16	5.28	5.12	4.93	5.03	4.9	2.3	9.76	4.78	9.75	9.38	12
VOC	ppmvd @ 15% O2	1.5	1.5	2	1	1	1	1	1	1	1	1	1.5	1	1.5	1.5	2
VOC	lb/hr as methane	5.13	4.94	8.82	3.37	2.01	3.35	3.25	3.13	3.19	3.11	1.46	4.63	3.03	4.63	4.45	7.24
CO2	lb/hr	339000	327000	433000	315000	187000	313000	303000	292000	298000	290000	136000	306000	283000	306000	294000	376000
NH3	ppmvd @ 15% O2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH3	lb/hr	19.3	18.6	24.7	17.9	10.7	17.8	17.3	16.6	17	16.5	7.76	17.4	16.1	17.4	16.8	21.5
SOx	lb/hr as SO2	4.848	4.668	6.204	4.488	2.712	4.536	4.392	4.236	4.308	4.2	1.98	4.428	4.092	4.416	4.26	5.448
Particulates - Filterable + Condensible, Including Sulfates	lb/hr	20	19.5	20.4	9.73	8.71	9.75	9.68	9.6	9.64	9.58	8.33	20.2	9.53	20.1	19.2	18
Sulfuric Acid Mist	lb/hr	3.11	3	3.99	2.89	1.74	2.91	2.82	2.72	2.77	2.7	1.27	2.84	2.63	2.84	2.73	3.5

The notes page is an integral part of this document and must be reviewed prior to use of this data.

OPERATING POINT		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Case Description		Unfired	24% DB Firing	10% DB Firing	73% DB Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
SITE CONDITIONS																	
Ambient Temperature	°F	100	100	100	100	100	100	100	100	100	50	50	-14.2	-14.2	-14.2	59	59
Ambient Pressure	psia	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Ambient Relative Humidity	%	40	40	40	40	40	40	40	40	40	60	60	20	20	20	60	60
PLANT STATUS																	
HRSG Duct Burner		Unfired	Fired	Fired	Fired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
SCR		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
CO Catalyst		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Evaporative Cooler state (On or Off)		On	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Gas Turbine Load	%	BASE	BASE	BASE	BASE	BASE	41%	75%	50%	BASE	75%	50%	75%	50%	BASE	75%	50%
Gas Turbines Operating		2	2	2	1	2	2	2	2	1	2	2	2	2	1	2	2
GT Diluent Injection Type		None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
GT Diluent Injection Flow (per GT)	10^3 lb/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FUEL DATA																	
Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
HHV	**BTU/lb**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**
LHV	**BTU/lb**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**	**20571**
Fuel Mol. Wt.	**lb/mole**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**16.8257**
Fuel Bound Nitrogen	Wt %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Sulfur Content	grains/100 SCF @ 60°F	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HRSG DATA (PER UNIT)																	
HRSG EXIT EXHAUST GAS																	
Composition:																	
Ar	mol %	0.8599	0.8661	0.8683	0.8583	0.8699	0.8701	0.8701	0.8700	0.8699	0.8899	0.8900	0.8901	0.8901	0.8901	0.8800	0.8900
CO_2	mol %	4.1196	4.4919	4.2472	5.3562	4.0696	3.5704	3.7404	3.5500	4.0696	4.0196	3.7200	4.0304	3.8904	4.0604	3.9800	3.6900
H_2O	mol %	11.1889	11.2516	10.7808	12.9150	10.4390	9.4709	9.8010	9.4300	10.4390	8.4992	7.9200	7.8208	7.5408	7.8608	8.7000	8.1300
N_2	mol %	72.4328	72.6664	72.8497	72.0191	72.9827	73.3673	73.2373	73.3800	72.9827	74.4526	74.6900	75.0075	75.1175	74.9875	74.2700	74.4900
O_2	mol %	11.3989	10.7239	11.2540	8.8514	11.6388	12.7213	12.3512	12.7700	11.6388	12.1388	12.7800	12.2512	12.5613	12.2012	12.1700	12.8000
Molecular weight		28.1109	28.1380	28.1674	28.0344	28.1886	28.2487	28.2282	28.2515	28.1886	28.3969	28.4324	28.4709	28.4889	28.4698	28.3705	28.4074
Temperature	°F	203	191	194	170	198	183	197	190	186	180	179	190	180	208	180	179
Mass Flow	lb/hr	4376400	4104500	4098400	4126500	4094000	2585100	3552200	2909600	4094000	3853500	3173100	4031000	3234000	5012700	3828300	3155300
Actual Volume Flow	Actual ft3/hr	77400000	71241000	71399000	69556000	71628000	44130000	62023000	50212000	70418000	65175000	53491000	68987000	54529000	88197000	64798000	53237000
HRSG EXIT EXHAUST GAS EMISSIONS																	
NOx	ppmvd @ 15% O2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NOx	lb/hr as NO2	17.4	17.8	16.8	21.5	16	8.85	12.8	9.89	16	14.8	11.3	15.5	12	19.4	14.5	11.1
CO	ppmvd @ 15% O2	0.9	1.7	1.7	1.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
CO	lb/hr	4.76	9.21	8.68	11.1	4.39	2.42	3.49	2.71	4.39	4.05	3.08	4.24	3.28	5.31	3.98	3.04
VOC	ppmvd @ 15% O2	1	1.5	1.5	2	1	1	1	1	1	1	1	1	1	1	1	1
VOC	lb/hr as methane	3.02	4.37	4.12	6.76	2.79	1.54	2.22	1.72	2.79	2.57	1.96	2.69	2.08	3.37	2.53	1.93
CO2	lb/hr	282000	288000	272000	347000	260000	144000	207000	161000	260000	240000	183000	251000	194000	315000	236000	180000
NH3	ppmvd @ 15% O2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH3	lb/hr	16.1	16.4	15.5	19.8	14.8	8.17	11.8	9.14	14.8	13.7	10.4	14.3	11.1	17.9	13.4	10.2
SOx	lb/hr as SO2	4.08	4.176	3.936	5.028	3.768	2.076	3	2.328	3.768	3.468	2.64	3.636	2.808	4.488	3.42	2.604
Particulates - Filterable + Condensible, Including Sulfates	lb/hr	9.52	17.6	19	17.2	9.26	8.38	8.86	8.51	9.26	9.11	8.67	9.19	8.76	9.73	9.08	8.65
Sulfuric Acid Mist	lb/hr	2.62	2.68	2.53	3.23	2.42	1.34	1.93	1.49	2.42	2.23	1.7	2.34	1.81	2.89	2.2	1.67

The notes page is an integral part of this document and must be reviewed prior to use of this data.

OPERATING POINT		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Case Description		13% DB Firing	11% DB Firing	11% DB Firing	22% DB Firing	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
SITE CONDITIONS																	
Ambient Temperature	°F	20	50	59	90	-14.2	-14.2	20	50	59	90	100	100	100	-14.2	-14.2	50
Ambient Pressure	psia	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Ambient Relative Humidity	%	60	60	60	60	20	20	60	60	60	60	40	40	40	20	20	60
PLANT STATUS																	
HRSG Duct Burner		Fired	Fired	Fired	Fired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired	Unfired
SCR		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
CO Catalyst		Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Evaporative Cooler state (On or Off)		Off	Off	Off	Off	Off	Off	Off	Off	Off	On	On	Off	Off	Off	Off	Off
Gas Turbine Load	%	BASE	BASE	BASE	BASE	BASE	50%	BASE	BASE	BASE	BASE	BASE	BASE	50%	BASE	75%	75%
Gas Turbines Operating		2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
GT Diluent Injection Type		None	None	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
GT Diluent Injection Flow (per GT)	10^3 lb/hr	0	0	0	0	167.1	82.9	171.2	172.5	168.5	143.8	143.2	138.3	65.8	167.1	123.5	120.8
FUEL DATA																	
Fuel Type		NG	NG	NG	NG	DO	DO	DO	DO	DO	DO	DO	DO	DO	DO	DO	DO
HHV	**BTU/lb**	**22808.87948**	**22808.87948**	**22808.87948**	**22808.87948**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**	**19398**
LHV	**BTU/lb**	**20571**	**20571**	**20571**	**20571**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**	**18300**
Fuel Mol. Wt.	**lb/mole**	**16.8257**	**16.8257**	**16.8257**	**16.8257**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**
Fuel Bound Nitrogen	Wt %	0	0	0	0	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%
Fuel Sulfur Content	grains/100 SCF @ 60°F	0.5	0.5	0.5	0.5	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HRSG DATA (PER UNIT)																	
HRSG EXIT EXHAUST GAS																	
Composition:																	
Ar	mol %	0.8882	0.8884	0.8784	0.8666	0.8501	0.8700	0.8500	0.8499	0.8400	0.8300	0.8300	0.8399	0.8499	0.8700	0.8600	0.8500
CO2	mol %	4.3076	4.3101	4.3094	4.4582	5.6606	5.4200	5.6000	5.5194	5.5000	5.4200	5.4200	5.3895	5.3295	5.0900	5.6600	5.5600
H2O	mol %	8.5450	9.0605	9.3381	11.4473	10.6211	9.1400	10.9100	11.4089	11.6200	13.0800	13.0900	12.6287	11.2789	9.1700	10.2000	10.8500
N2	mol %	74.6383	74.2401	74.0234	72.4874	71.7772	72.8500	71.5300	71.1029	70.9400	69.7700	69.7600	70.1130	71.1429	72.7000	72.1100	71.5600
O2	mol %	11.6209	11.5009	11.4508	10.7404	11.0911	11.7200	11.1100	11.1189	11.1000	10.9000	10.9000	11.0289	11.3989	12.1700	11.1700	11.1800
Molecular weight		28.4175	28.3616	28.3306	28.1138	28.4008	28.5378	28.3629	28.3005	28.2744	28.1064	28.1054	28.1530	28.2943	28.4999	28.4471	28.3653
Temperature	°F	181	179	178	187	304	270	293	295	295	292	302	289	280	293	280	273
Mass Flow	lb/hr	4929300	4729900	4652400	4262100	4989600	3223500	4962300	4919300	4838400	4546500	4529700	4249400	2703800	4989600	4000500	3856700
Actual Volume Flow	Actual ft3/hr	83427000	79909000	78550000	73539000	100730000	61879000	98760000	98497000	96865000	91238000	92125000	84805000	53066000	98839000	78095000	74800000
HRSG EXIT EXHAUST GAS EMISSIONS																	
NOx	ppmvd @ 15% O2	2	2	2	2	5	5	5	5	5	5	5	5	5	5	5	5
NOx	lb/hr as NO2	20.3	19.5	19.2	18.4	52	32	51.2	50.1	49.2	45.8	45.6	42.6	26.6	46.5	41.7	39.5
CO	ppmvd @ 15% O2	1.7	1.7	1.7	1.7	2	2	2	2	2	2	2	2	2	2	2	2
CO	lb/hr	10.5	10.1	9.93	9.5	12.7	7.79	12.5	12.2	12	11.2	11.1	10.4	6.48	11.3	10.1	9.62
VOC	ppmvd @ 15% O2	1.5	1.5	1.5	1.5	2	2	2	2	2	2	2	2	2	2	2	2
VOC	lb/hr as methane	4.98	4.8	4.72	4.51	6.19	3.98	6.16	6.12	6.03	5.7	5.68	5.32	3.37	6.19	4.95	4.79
CO2	lb/hr	329000	316000	311000	297000	438000	269000	431000	422000	414000	386000	384000	358000	224000	392000	350000	333000
NH3	ppmvd @ 15% O2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH3	lb/hr	18.7	18	17.7	17	19.2	11.8	18.9	18.5	18.2	16.9	16.9	15.7	9.83	17.2	15.4	14.6
SOx	lb/hr as SO2	4.752	4.584	4.512	4.308	4.92	3.036	4.848	4.752	4.656	4.344	4.32	4.032	2.52	4.92	3.948	3.744
Particulates - Filterable + Condensible, Including Sulfates	lb/hr	20.7	19.9	20	19.1	42.6	41.6	42.5	42.5	42.4	42.3	42.2	42.1	41.3	42.6	42	41.9
Sulfuric Acid Mist	lb/hr	3.06	2.94	2.9	2.77	3.16	1.95	3.12	3.05	2.99	2.79	2.78	2.59	1.62	3.16	2.53	2.41

The notes page is an integral part of this document and must be reviewed prior to use of this data.

OPERATING POINT		49	50	51	52	53
Case Description		Unfired	Unfired	Unfired	Unfired	Unfired
SITE CONDITIONS						
Ambient Temperature	°F	50	100	100	59	59
Ambient Pressure	psia	14.3	14.3	14.3	14.3	14.3
Ambient Relative Humidity	%	60	40	40	60	60
PLANT STATUS						
HRSG Duct Burner		Unfired	Unfired	Unfired	Unfired	Unfired
SCR		Operating	Operating	Operating	Operating	Operating
CO Catalyst		Operating	Operating	Operating	Operating	Operating
Evaporative Cooler state (On or Off)		Off	Off	Off	Off	Off
Gas Turbine Load	%	50%	BASE	75%	75%	50%
Gas Turbines Operating		2	1	2	2	2
GT Diluent Injection Type		Water	Water	Water	Water	Water
GT Diluent Injection Flow (per GT)	10^3 lb/hr	83.8	138.3	98.6	118.7	81.4
FUEL DATA						
Fuel Type		DO	DO	DO	DO	DO
HHV	**BTU/lb**	**19398**	**19398**	**19398**	**19398**	**19398**
LHV	**BTU/lb**	**18300**	**18300**	**18300**	**18300**	**18300**
Fuel Mol. Wt.	**lb/mole**	**138.2500**	**138.2500**	**138.2500**	**138.2500**	**138.2500**
Fuel Bound Nitrogen	Wt %	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%	≤ 0.015%
Fuel Sulfur Content	grains/100 SCF @ 60°F	3.83	3.83	3.83	3.83	3.83
HRSG DATA (PER UNIT)						
HRSG EXIT EXHAUST GAS						
Composition:						
Ar	mol %	0.8599	0.8399	0.8401	0.8500	0.8601
CO_2	mol %	5.5694	5.3895	5.4405	5.5400	5.5506
H_2O	mol %	10.3390	12.6287	12.1112	11.0600	10.5211
N_2	mol %	71.9628	70.1130	70.5371	71.3900	71.8172
O_2	mol %	11.2689	11.0289	11.0711	11.1600	11.2511
Molecular weight		28.4226	28.1530	28.2146	28.3403	28.4007
Temperature	°F	269	278	279	272	268
Mass Flow	lb/hr	2982000	4249400	3398900	3810500	2937900
Actual Volume Flow	Actual ft3/hr	57365000	83502000	66779000	73868000	56521000
HRSG EXIT EXHAUST GAS EMISSIONS						
NOx	ppmvd @ 15% O_2	5	5	5	5	5
NOx	lb/hr as NO_2	30.6	42.6	34.3	38.9	30
CO	ppmvd @ 15% O_2	2	2	2	2	2
CO	lb/hr	7.44	10.4	8.34	9.48	7.31
VOC	ppmvd @ 15% O_2	2	2	2	2	2
VOC	lb/hr as methane	3.7	5.32	4.24	4.74	3.64
CO_2	lb/hr	257000	358000	288000	328000	253000
NH_3	ppmvd @ 15% O_2	5	5	5	5	5
NH_3	lb/hr	11.3	15.7	12.7	14.4	11.1
SOx	lb/hr as SO_2	2.892	4.032	3.24	3.684	2.844
Particulates - Filterable + Condensible, Including Sulfates	lb/hr	41.5	42.1	41.7	41.9	41.5
Sulfuric Acid Mist	lb/hr	1.86	2.59	2.09	2.37	1.83

The notes page is an integral part of this document and must be reviewed prior to use of this data.

Heat Balance data provided by GE has been removed as confidential and proprietary information from the Permit Application for Stationary Sources of Air Pollution for the CPV Towantic Energy Center that GE considers to be trade secrets. 68 pages of heat balance data were provided with each page containing a header beginning with the letter "HB…." followed by additional descriptors. This information was provided to CPV Towantic, LLC by GE under the protection of a Non-Disclosure Agreement, and was inadvertently included in the application. These 68 pages contain sensitive and proprietary GE design information that has been removed from the submitted permit application. These 68 pages do not contain any air pollutant emissions data, and have been replaced by a replacement sheet identified as "CPV Towantic Unit Heat Consumption and Gross Power Output" (following this page).

The first 6 pages of Appendix B consists of GE-provided emission data identified as Drawing Number 240A2083. GE has expressly provided CPV Towantic, LLC permission to include the emissions data provided in the first 6 pages of Appendix B and the attached "CPV Towantic Unit Heat Consumption and Gross Power Output" replacement sheet. The contents of the 6 page drawing includes emissions data, exhaust data and operating data for the combustion turbines. These 6 pages plus the "CPV Towantic Unit Heat Consumption and Gross Power Output" replacement sheet provide all necessary technical data for evaluation of the permit application.

The GE confidential and proprietary information is being held by the Department and any requests to view this information should contact the Department at:

Office of Director; Engineering & Enforcement Division; Bureau of Air Management; Department of Energy and Environmental Protection; 79 Elm Street, 5th Floor; Hartford, Connecticut 06106-5127.

CPV Towantic

Unit Heat Consumption and Gross Power Output

Ambient Temperature	°F	59	59	59
Ambient Relative Humidity	%	60	60	60
Fuel Type		NG	NG	DO
Gas Turbine Heat Consumption[1]	MMBTU/hr, HHV	2423.5	2423.5	2391.2
Duct Burner Heat Consumption[1]	MMBTU/hr, HHV	0.0	110.0	0.0
Gross CC Power Output	MW	777.5	804.9	702.3

[1] Heat consumption values are on a per turbine basis

GE Energy

1.0 INTRODUCTION

CB Nebraska Boiler & **CB Natcom** form the engineered boiler/burner division of the **Cleaver-Brooks** family of companies. We are committed to offering integrated boiler/burner solutions to the industry. This group of companies has been in this business for more than 80 years and continues to enjoy a large percentage of the market share. We maintain our leadership in the industrial watertube market by offering innovative solutions and a true single-source responsibility to our customers for boilers, burners, controls & auxiliary equipment. This commitment to overall system design ensures that your equipment operates efficiently and lasts for years to come.

For your unique application, we are offering a packaged solution with the following design features:

1.1 OUTLET STEAM CONDITIONS:

Capacity:	77000 LB/HR ¤
Operating Pressure:	200 PSIG (at exit of non-return valve) ¤
Steam Temperature:	Saturated at 387 °F
Steam Quality:	99.5% dry steam ¤

1.2 BOILER DESIGN:

Type:	D-Type Industrial Watertube
Model:	NB-300D-70
Vessel Design Pressure:	250 psig

1.3 BURNER DESIGN:

Type:	Ultra Low-NOx Register
Main Fuel:	Natural Gas
Emissions:	9 PPM Nox

1.4 ECONOMIZER DESIGN:

Type:	Rectangular Finned-Tube
Arrangement:	Vertical Gas Flow; Counter-Current Water Flow
Design Pressure:	300 psig
Inlet Feedwater Temp:	228°F

1.5 STACK DESIGN:

Type:	Freestanding
Diameter (at exit):	78”
Height (from grade):	125 ft

CleaverBrooks
6940 Cornhusker Highway
Lincoln, NE 68507
402.434.2000
cleaverbrooks.com

"Standard" Burner Emissions Values (in lb/mmbtu)

	Natural Gas	#2 Oil	#6 Oil
NOx	0.100	0.120[1]	0.440[2]
CO	0.037	0.077	0.077
SO_2*	0.006	0.052	0.540
VOC	0.004	0.005	0.006
PM_{10}	0.007	0.050	0.100

"Low-NOx" Burner Emissions Values (in lb/mmbtu)

	Natural Gas	#2 Oil	#6 Oil
NOx	0.036	0.100[1]	0.380[2]
CO	0.037	0.077	0.077
SO_2*	0.006	0.052	0.540
VOC	0.004	0.005	0.005
PM_{10}	0.007	0.050	0.100

"Ultra Low-NOx" Burner Emissions Values (in lb/mmbtu)

	Natural Gas	#2 Oil	#6 Oil
NOx	0.011	0.100[1]	NA
CO	0.037	0.077	NA
SO_2*	0.006	0.052	NA
VOC	0.004	0.005	NA
PM_{10}	0.007	0.050	NA

[1] *Based on a fuel-bound Nitrogen content <u>not exceeding</u> 0.02% (by weight).*
[2] *Based on a fuel-bound Nitrogen content <u>not exceeding</u> 0.40% (by weight).*
***Based on a sulfur content <u>not exceeding</u> 0.2 grains of Sulfur per 100 CUFT of natural gas OR 0.5% (by weight) for fuel oils. Sulfur emissions are not burner-dependent.*

The above values are based on industry averages and may or may not represent requirements for any given region of the United States. Emissions regulations vary from state-to-state.

3.0 BOILER DESIGN DATA

Boiler Dimensions:		**Units**
Height to Main Steam Outlet	14 Ft 7 In	FT
Overall Width of Unit	11 Ft 7.5 In	FT
Overall Length of Unit*	25.33 Ft.	FT
**Add approximately 6-8 ft length for burner.*		
Weight of Unit (Dry)	80,249.49	LBS
Weight of Unit (Wet)	102,381.53	LBS
Surface Area / Volume:		**Units**
Furnace Volume	1,379	FT3
Furnace Projected Area	819	FT2
Evaporator Area	4,277	FT2
Total Area	5,096	FT2
Economizer Area	13,317	FT2
Superheater Area	-	FT2
Tubing Data:		**Units**
Tube OD	2.0	IN
Tube Wall Thickness – Furnace Section	0.105	IN
Tube Wall Thickness – Convection Section	0.105	IN
Tube Material	SA178A	
Corrosion Allowance	NA	IN
Steam Drum:		**Units**
Inside Drum Diameter:	42 In	IN
Drum Length	25.33 Ft. Seam/Seam	FT
Drum Material:	SA516 Grade 70	
Corrosion Allowance:	NA	IN
Water Drum:		**Units**
Drum Diameter:	24 In	IN
Drum Length	25.33 Ft. Seam/Seam	FT
Drum Material:	SA106 Grade B	
Corrosion Allowance:	NA	IN
Standard Drum Connections:	**Quantity**	**Type**
Main Steam Outlet:	One	Flanged
Safety Valves:	Per ASME Code	Flanged
Feedwater Inlet:	One	Flanged
Bottom Drum Blowoff:	Two	Flanged
Water Column:	Two	Threaded (NPT)
Feedwater Regulator:	Two	Flanged
Vent:	One	NPT
Continuous Blowdown:	One	NPT
Chemical Feed:	One	NPT
Sootblower:	Two	Flanged
Auxiliary L.W. Cutouts:	One	NPT

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

4.0 BOILER PERFORMANCE DATA

Fuel: Natural Gas

Boiler load - %	**100%**	**75%**	**50%**	**25%**	**Units**
Steam Flow - ¤	77,000	57,750	38,500	19,250	Lb/Hr
Steam Pressure – Operating - ¤	200.0	200.0	200.0	200.0	PSIG
Steam Temperature - ¤	387.0	387.0	387.0	387.0	°F
Fuel Input (HHV)	92.4	69.1	46.0	23.2	MMBTU/Hr
Ambient Air Temperature	80.0	80.0	80.0	80.0	°F
Relative Humidity	60	60	60	60	%
Excess Air	25	25	25	25	%
Flue Gas Recirculation	25	25	25	25	%
Steam Output Duty	77	58	39	19	MMBTU/hr
Heat Release Rate	67,012	50,097	33,366	16,805	BTU/FT3-Hr
Heat Release Rate	112,882	84,389	56,204	28,308	BTU/FT2-Hr
Deaerator Pegging Steam	-	-	-	-	Lb/Hr
Feed Water Temperature	227	227	227	227	°F
Water Temp. Leaving Economizer	321	309	297	288	±10°F
Blow Down	1.0	1.0	1.0	1.0	%
Boiler Gas Exit Temperature	543	498	451	409	±10°F
Economizer Gas Exit Temp.	299	282	266	251	±10°F
Air Flow	84,454	63,137	42,050	21,179	Lb/Hr
Flue Gas to Stack	88,692	66,305	44,160	22,241	Lb/Hr
Flue Gas Including FGR	110,865	82,881	55,200	27,802	Lb/Hr
Fuel Flow	4,237	3,167	2,109	1,062	Lb/Hr
Flue Gas Losses/Efficiency-%					
Dry Gas Loss	4.5	4.2	3.8	3.5	%
Air Moisture Loss	0.1	0.1	0.1	0.1	%
Fuel Moisture Loss	10.6	10.6	10.5	10.4	%
Casing Loss	0.5	0.7	1.0	2.0	%
Margin	0.5	0.5	0.5	0.5	%
Efficiency - LHV	92.8	93.1	93.2	92.5	%
Efficiency – HHV - ¤	83.7	84.0	84.1	83.5	%
Total Pressure Drop Including Economizer	9.46	5.30	2.35	0.56	IN WC
Products of Combustion - CO2	7.7	7.7	7.7	7.7	%
- H2O	16.9	16.9	16.9	16.9	%
-N2	71.7	71.7	71.7	71.7	%
-O2	3.8	3.8	3.8	3.8	%
-SO2	-	-	-	-	%
GAS- % volume	**NG**				
methane	90.00				
ethane	5.00				
nitrogen	5.00				
LHV-Btu/lb	19,687				
HHV-Btu/lb	21,815				

**The above information is preliminary and shall be confirmed at time of engineering submittal.*

Diesel Generator Set

Image shown may not reflect actual package

Standby
1500 ekW 1875 kVA
60 Hz 1800 rpm 480 Volts

Caterpillar is leading the power generation Market place with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FUEL/EMISSIONS STRATEGY
- EPA Certified for Stationary Emergency Application (EPA Tier 2 emissions levels)

DESIGN CRITERIA
- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200
- UL 2200 packages available. Certain restrictions may apply. Consult with your Cat dealer.

FULL RANGE OF ATTACHMENTS
- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER
- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT
- Cat® dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries.
- The Cat® SOS℠ program effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by products.

CAT 3512C ATAAC DIESEL ENGINE
- Reliable, rugged, durable design
- Field proven in thousands of applications worldwide
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight

CAT GENERATOR
- Matched to the performance and output characteristics of Caterpillar engines
- Single point access to accessory connections
- UL 1446 Recognized Class H insulation

CAT EMCP 4 CONTROL PANELS
- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

STANDBY 1500 ekW 1875 kVA

60 Hz 1800 rpm 480 Volts

Factory Installed Standard & Optional Equipment

System	Standard	Optional
Air Inlet	• Single element canister type air cleaner with service indicator	[ ] Dual element air cleaners
Cooling	• Package mounted radiator	
Exhaust	• Exhaust flange outlet	[ ] Mufflers
Fuel	• Secondary fuel filters • Fuel cooler • Fuel priming pump	
Generator	• Matched to the performance and output characteristics of Cat engines	[ ] Oversize & premium generators [ ] Permanent magnet excitation (PMG) [ ] Internal excitation (IE) [ ] Winding temperature detectors [ ] Anti-condensation space heaters
Power Termination	• Bus bar	[ ] Circuit breakers, UL listed [ ] Bottom cable entry [ ] Right, left, and/or rear power termination
Governor	• ADEM™ A3	[ ] Load share module
Control Panel	• EMCP 4	[ ] EMCP 4.2 [ ] EMCP 4.3 [ ] EMCP 4.4 [ ] Local & remote annunciator modules [ ] Digital I/O Module [ ] Generator temperature monitoring & protection
Mounting		[ ] Spring type vibration isolator [ ] IBC 2006 seismic certification
Starting / Charging	• 24 volt starting motor(s) • Batteries with rack and cables • Battery disconnect switch	[ ] Battery chargers (10 & 20 Amp) [ ] 45A charging alternator [ ] Oversize batteries [ ] Ether starting aids [ ] Heavy duty starting motors [ ] Barring device (manual) [ ] Air starting motor with control & silencer [ ] Jacket water heater
General	• Paint – Caterpillar Yellow except rails and radiators gloss black	[ ] UL 2200 listed [ ] CSA Certification

STANDBY 1500 ekW 1875 kVA

60 Hz 1800 rpm 480 Volts

SPECIFICATIONS

CAT GENERATOR

Frame ……………………..………………..…….. 1447
Excitation ………………………………..………..…PM
Pitch………………………………………….………0.6667
Number of poles……………..…………………………4
Number of leads……………………..…………………6
Number of bearings ……………..……..Single Bearing
Insulation ………………………………………Class H
IP rating ………………………………..Drip proof IP23
Over speed capability - % of rated………………125%
Wave form deviation………………………………...2 %
Voltage regulator…………………… 3 phase sensing
Voltage regulation….Less than ±1/2% (steady state)
Less than ±1/2% (3% speed change)

CAT DIESEL ENGINE

3512C ATAAC, V-16, 4 stroke, water-cooled diesel

Bore ………………………………170.00 mm (6.69 in)
Stroke ……………………………..190.00 mm (7.48in)
Displacement ……………………51.80 (3161.03 in^3)
Compression ratio……………….…………………14.7:1
Aspiration…………………….………………………TA
Fuel system……………………Electronic unit injection
Governor Type………………………………. ADEM™ A3

CAT EMCP 4 CONTROL PANELS

EMCP 4 controls including:
- Run / Auto / Stop Control
- Speed & Voltage Adjust
- Engine Cycle Crank
- Emergency stop pushbutton

EMCP 4.2 controller features:
- 24-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:
- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- Power Factor (per phase & average)
- kW (per phase, average & percent)
- kVA (per phase, average & percent)
- kVAr (per phase, average & percent)
- kW-hr & kVAr-hr (total)

Warning/shutdown with common LED indication of shutdowns for:
- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

Programmable protective relaying functions:
- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (kW) (32)
- Reverse Reactive Power (kVAr) (32RV)
- Overcurrent (50/51)

Communications
- Customer data link (Modbus RTU)
- Accessory module data link
- Serial annunciator module data link

- 6 programmable digital inputs
- 4 programmable relay outputs (Form A)
- 2 programmable relay outputs (Form C)
- 2 programmable digital outputs

Compatible with the following optional modules:
- Digital I/O module
- Local Annunciator
- Remote annunciator
- RTD module
- Thermocouple module

STANDBY 1500 ekW 1875 kVA

60 Hz 1800 rpm 480 Volts

Technical Data

Open Generator Set - 1800 rpm/60 Hz/480 Volts		
EPA Certified for Stationar Emergency Applications		
(EPA Tier 2 emissions levels)		
Generator Set Package Performance		
Genset Power rating @ 0.8 pf	1875 kVA	
Genset Power Rating with fan	1500 ekW	
Fuel Consumption		
100% Load with fan	396.0 L/hr	104.6 Gal/hr
75% Load with fan	310.5 L/hr	82.0 Gal/hr
50% Load with fan	219.8 L/hr	58.1 Gal/hr
Cooling System[1]		
Air flow restriction (system)	0.12 kPa	0.48 in. water
Air flow (max @ rated speed for radiator arrangement)	2075 m3/min	73278 cfm
Engine coolant capacity with radiator	390.8 L	103.2 gal
Engine coolant capacity	156.8 L	41.4 gal
Radiator coolant capacity	234.0 L	61.8 gal
Inlet Air		
Combustion air inlet flow rate	129.4 m^3/min	4569.7 cfm
Exhaust System		
Exhaust stack gas temperature (engine out)	403.9 °C	759.0 °F
Exhaust gas flow rate	308.9 mm^3/min	10908.7 cfm
Exhaust flange size (internal diameter)	203.2 mm	8.0 in
Exhaust system backpressure (maximum allowable)	6.7 kPa	26.9 in water
Heat Rejection		
Heat rejection to cooolant (total)	616 kW	35032 Btu/min
Heat rejection to exhaust (total)	1322 kW	75182 Btu/min
Heat rejection to aftercooler	481 kW	27354 Btu/min
Heat rejection to atmosphere from engine	124 kW	7052 Btu/min
Heat rejection to atmosphere from generator	74 kW	3141 Btu/min
Alternator[2]		
Motor starting capabiliy @30% voltage dip	4350 skVA	
Frame	1447	
Temperature Rise	150 °C	270 °F
Lube System		
Sump refil with filter	310.4 L	82 gal
Emissions (Nominal)[3]		
NOx g/hp-hr	4.08 g/hp-hr	
CO g/hp-hr	0.44 g/hp-hr	
HC g/hp-hr	0.11 g/hp-hr	
PM g/hp-hr	0.03 g/hp-hr	

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Generator temperature rise is basd on a 40 degree C ambient per NEMA MG1-32. UL 2200 Listed ppackages may have oversized generators with a different temperature rise and motor starting characteristics.

[3] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle. Emissions values are tailpipe out with aftertreatment installed. Values shown as zero may be greater than zero but were below the detection level of the equipment used at the time of measurement.

PERFORMANCE DATA[DM8260]

May 7, 2014

Performance Number: DM8260

Change Level: 03

SALES MODEL:	3512C	**COMBUSTION:**	DI
ENGINE POWER (BHP):	2,206	**ENGINE SPEED (RPM):**	1,800
GEN POWER WITH FAN (EKW):	1,500.0	**HERTZ:**	60
COMPRESSION RATIO:	14.7	**FAN POWER (HP):**	88.5
RATING LEVEL:	STANDBY	**ASPIRATION:**	TA
PUMP QUANTITY:	2	**AFTERCOOLER TYPE:**	ATAAC
FUEL TYPE:	DIESEL	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	**INLET MANIFOLD AIR TEMP (F):**	122
GOVERNOR TYPE:	ADEM3	**JACKET WATER TEMP (F):**	210.2
ELECTRONICS TYPE:	ADEM3	**TURBO CONFIGURATION:**	PARALLEL
CAMSHAFT TYPE:	STANDARD	**TURBO QUANTITY:**	4
IGNITION TYPE:	CI	**TURBOCHARGER MODEL:**	GTB4708BN-52T-0.96
INJECTOR TYPE:	EUI	**CERTIFICATION YEAR:**	2006
FUEL INJECTOR:	2664387	**CRANKCASE BLOWBY RATE (FT3/HR):**	2,203.4
UNIT INJECTOR TIMING (IN):	64.34	**FUEL RATE (RATED RPM) NO LOAD (GAL/HR):**	9.9
REF EXH STACK DIAMETER (IN):	10	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,244.1
MAX OPERATING ALTITUDE (FT):	3,937		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,500.0	100	2,206	307	0.332	104.6	77.5	120.9	1,145.6	74.6	759.0
1,350.0	90	1,983	276	0.336	95.2	72.2	116.1	1,102.7	68.8	726.8
1,200.0	80	1,768	246	0.343	86.6	66.9	113.2	1,069.1	63.1	708.7
1,125.0	75	1,662	232	0.346	82.0	63.4	111.5	1,052.3	59.5	700.6
1,050.0	70	1,556	217	0.348	77.4	59.7	109.8	1,035.3	55.8	693.6
900.0	60	1,349	188	0.352	67.9	51.1	107.1	1,000.5	47.6	682.5
750.0	50	1,144	159	0.355	58.1	40.6	107.5	963.7	38.4	686.4
600.0	40	940	131	0.359	48.2	30.0	108.4	921.9	29.4	686.0
450.0	30	736	103	0.368	38.6	20.9	107.1	856.1	21.9	667.6
375.0	25	632	88	0.376	33.9	16.9	106.2	809.6	18.8	648.1
300.0	20	527	73	0.388	29.2	13.3	105.2	754.6	16.0	621.1
150.0	10	312	43	0.443	19.7	7.3	103.2	609.7	11.4	526.2

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,500.0	100	2,206	82	449.8	4,570.7	10,909.2	20,179.4	20,912.0	4,401.2	3,984.7
1,350.0	90	1,983	77	428.8	4,387.3	10,167.0	19,354.1	20,020.6	4,213.1	3,825.4
1,200.0	80	1,768	71	409.0	4,190.2	9,533.7	18,456.0	19,062.3	4,012.0	3,655.5
1,125.0	75	1,662	68	396.6	4,062.8	9,156.1	17,861.1	18,435.5	3,879.9	3,539.6
1,050.0	70	1,556	64	382.7	3,917.6	8,750.8	17,185.6	17,727.5	3,730.8	3,407.5
900.0	60	1,349	55	350.3	3,576.3	7,863.4	15,607.1	16,082.3	3,384.9	3,097.2
750.0	50	1,144	44	309.9	3,132.5	6,856.9	13,608.7	14,015.1	2,941.7	2,693.8
600.0	40	940	33	266.6	2,669.6	5,821.5	11,547.1	11,884.6	2,498.4	2,290.8
450.0	30	736	23	224.6	2,255.4	4,830.1	9,719.1	9,989.4	2,106.6	1,937.5
375.0	25	632	19	204.3	2,072.0	4,354.9	8,915.9	9,153.2	1,932.9	1,782.3
300.0	20	527	15	184.3	1,901.9	3,888.6	8,175.8	8,380.0	1,769.0	1,636.5
150.0	10	312	9	148.8	1,629.0	3,012.8	6,991.2	7,129.2	1,502.5	1,404.3

Rating Specific Emissions Data - John Deere Power Systems

JOHN DEERE

Nameplate Rating Information

Clarke Model	JW6H-UFADJ0
Power Rating (BHP / kW)	350 / 261
Certified Speed (RPM)	1760

Rating Data

Rating	6090HFC47A	
Certified Power (kW)	315	
Rated Speed	1760	
Vehicle Model Number	Clarke Fire Pump	
Units	g/kW-hr	g/hp-hr
NOx	3.5	2.6
HC	0.1	0.1
NOx + HC	3.7	2.7
Pm	0.14	0.11
CO	0.9	0.7

Certificate Data

Engine Model Year	2014
EPA Family Name	EJDXL09.0114
EPA JD Name	450HAB
EPA Certificate Number	EJDXL09.0114-013
CARB Executive Order	Not Applicable
Parent of Family	6090HFG84A
Units	g/kW-hr
NOx	3.8
HC	0.1
NOx + HC	3.9
Pm	0.13
CO	0.9

* The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardw are, and w e do not guarantee that every production engine w ill have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, or other conditions beyond our control.