TETRA TECH

MEMO

To:	James Grillo, Connecticut Department of Energy and Environmental Protection (CTDEEP)
From:	Steven Babcock
Date:	August 8, 2016
Subject:	Killingly Energy Center - Updates and Clarifications Relevant to Air Analysis

NTE Connecticut, LLC (NTE) submitted an application for a permit to construct and operate for the proposed Killingly Energy Center (KEC) located in Killingly, CT. The application proposed to install and continuously operate a natural gas fired heater to prevent condensation in the natural gas delivered to the combustion turbine generator (CTG). Based upon NTE's expected operation of the natural gas fired heater and consistent with the air dispersion report submitted to CTDEEP on May 25, 2016, NTE will limit operation of this source to 4,000 hours per year. This will result in a reduction in annual emissions from the natural gas heater and the overall project.

In addition to limiting the annual operating hours of the natural gas heater, a minor discrepancy was identified between the proposed operating hours of the auxiliary boiler in the air permit application and what was used in the air dispersion modeling analysis as documented in the Ambient Air Quality Analysis report. The air permit proposed to limit operation of the auxiliary boiler to 4,600 hours per year whereas the air dispersion modeling report limited operating hours to 4,000 per year when predicting annual impact concentrations. The dispersion modeling has been revised to reflect a limit of 4,600 hour per year for the auxiliary boiler, consistent with the air permit application. The revised dispersion modeling analysis has also taken into account the lower carbon monoxide emission rates from the CTG presented in a memo to CTDEEP dated July 14, 2016. The auxiliary boiler is not a significant contributor to the maximum predicted impact concentrations for KEC and, therefore, the increase in operating hours did not materially affect the modeling results.

These changes will align the proposed operating restrictions and emissions in the air permit application and air dispersion modeling analysis. Updated modeling files will be provided to Jude Catalano. Attached to this memo is the following revised information to reflect the proposed changes:

- Table E-6: Facility-Wide Annual Potential Emissions (tons per year [tpy]);
- Revised application forms
  - Att. E212 GH
  - Att. F
  - Att. G3
- Appendix A: Supporting Emission Calculations
- Appendix B: Revised Ambient Air Quality Analysis report pages

No changes to the modeling procedures documented in the modeling report dated May 25, 2016 have been made. Therefore, the revised air dispersion modeling analysis presents only the revised inputs and results, as applicable. Specifically, the results now reflect the revisions to the emissions and operating limits described in the memo to CTDEEP dated July 14, 2016 and this memo. The revised pages for the Ambient Air Quality Analysis report include the following:

- Table L-2 PSD Regulatory Threshold Evaluation
- Table L-5. Load Scenarios and Emission Rates - Combined Cycle Combustion Turbine Firing Natural Gas
- Table L-7. Startup Condition Stack Parameters for Each Fuel
- Table L-8. Stack Parameters for Ancillary Equipment
- Table L-10. Maximum Predicted Impact Concentrations
- Table L-15. Predicted Air Quality Impacts Compared to SO_2 and PM_{10} Vegetation Impact Thresholds
- Appendix L-A: DETAILED SOURCE PARAMETER DATA,
    - Combined Cycle Combustion Turbine and Ancillary Equipment Emissions Estimates
- Appendix L-C: DETAILED AERMOD RESULTS SUMMARY,
    - Combined Cycle Combustion Turbine Emissions Estimates,
    - AERMOD Scaled Impacts – turbine only (µg/m3) – 150 ft. turbine stack,
    - Combined Cycle Combustion Turbine – Start-up/Shutdown (SU/SD) Emissions Estimates
    - AERMOD SU/SD Scaled Impacts – turbine only (µg/m3) – 150 ft. turbine stack
    - Killingly Energy Center – Detailed Results Table

TABLE E-6: FACILITY-WIDE ANNUAL POTENTIAL EMISSIONS (tons per year [tpy])

Table E-6: Facility-Wide Annual Potential Emissions (tons per year [tpy])

Pollutant	CTG & Duct Burners	Auxiliary Boiler	Natural Gas Heater	Emergency Generator	Fire Pump	Facility Total
NO_x[a]	133.9	1.64	0.29	2.92	0.30	139.1
CO[a]	133.8	7.14	0.89	1.60	0.26	143.6
VOC[a]	48.3	0.78	0.08	0.15	0.02	49.3
SO_2	24.7	0.29	0.04	0.003	0.0005	25.1
$PM_{10}/PM_{2.5}$	100.8	0.97	0.12	0.09	0.02	102.0
GHG (as CO_2e)	1,966,937	22,610	2,809	308	49	1,993,260[b]
H_2SO_4	8.76	0.02	0.003	0.0002	0.00003	8.8
Lead (Pb)	0.0018	$9.5x10^{-5}$	$1.2x10^{-5}$	$1.4x10^{-6}$	$2.3x10^{-7}$	0.002
NH_3	49.5	N/A	N/A	N/A	N/A	49.5
Max Individual HAP (hexane)	7.06	0.35	0.04	N/A	N/A	7.5
Total HAPs	14.1	0.37	0.05	0.01	0.003	14.6

[a] Includes incremental emissions due to start-up and shutdown.
[b] Includes 547 tpy of fugitive GHG emissions from circuit breakers and natural gas handling.

REVISED APPLICATION FORMS

Attachment E212: Unit Emissions Supplemental Application Form

Applicant Name: NTE Connecticut, LLC
Unit No.: GH

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	0.06	0.26	0.06	0.005 lb/MMBtu	0.12
PM_{10}	0.06	0.26	0.06	0.005 lb/MMBtu	0.12
$PM_{2.5}$ Total (filterable + condensable)	0.06	0.26	0.06	0.005 lb/MMBtu	0.12
SO_x	0.02	0.08	0.02	0.0015 lb/MMBtu	0.04
NO_x	0.13	0.57	0.13	0.012 lb/MMBtu	0.29
CO	0.44	1.9	0.44	0.037 lb/MMBtu	0.89
VOC	0.04	0.18	0.04	0.0034 lb/MMBtu	0.08
Pb	5.9E-06	2.6E-05	5.9E-06	4.9E-07 lb/MMBtu	1.2E-05
GHG	1,404	6,151	1,404	119 lb/MMBtu	2,809
Hazardous or Other Air Pollutants					
See Appendix A					

Potential Emissions Calculation Basis: Vendor Data

Proposed Allowable Emissions Calculation Basis: Vendor Data and 4,000 hrs/yr of operation

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 F: Premises Information Form

Applicant Name: NTE Connecticut, 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.

Equipment Operating Under RCSA section 22a-174-3c (Check all that apply)		Fuels Used (Check all that apply)	Number of Fuels Used	Potential Emissions for Each Pollutant (tpy)	Total Potential Emissions for Each Pollutant (tpy)
External Combustion Unit	☐	☐ 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		**15**	
Emergency Engine	☐				
Nonmetallic Mineral Processing Equipment	☐	**N/A**	**N/A**	**15**	
Automotive Refinishing Operation	☐	**N/A**	**N/A**	**15**	
Surface Coating Operation	☐	**N/A**	**N/A**	**15**	
			Totals for Each Pollutant (tpy)		

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		0	0	0	0	0	0	0	0	0
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	102.0	102.0	102.0	25.1	139.1	49.3	143.6	0.02	1,993,260
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)	102.0	102.0	102.0	25.1	139.1	49.3	143.6	0.02	1,993,260
New Premises Total Emissions	102.0	102.0	102.0	25.1	139.1	49.3	143.6	0.02	1,993,260
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 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	CT	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Duct Burner	DB	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4 & NH3
Auxliary Boiler	DB1	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Emergency Generator Engine	DB2	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Emergency Fire Pump Engine	AB	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Natural Gas Heater	GH	☒	☒	☒	☒	☒	☒	☒	☒	☒	H2SO4
Fugitive Emissions	FG	☐	☐	☐	☐	☐	☐	☐	☒	☐	H2SO4
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	☐	
Baseline Project Emissions Total in tons per year (tpy):		102.0	102.0	102.0	25.1	139.1	143.6	49.3	1,993,260	58.3	**Comments:**
Allowable Project Emissions Total in tons per year (tpy):		102.0	102.0	102.2	25.1	139.1	143.6	49.3	1,993,260	58.3	

APPENDIX A: SUPPORTING EMISSION CALCULATIONS

NTE Connecticut, LLC - Killingly Energy Center

Facility-Wide Potential Annual Emissions (TPY)

Pollutant	CTG & Duct Burners	Auxiliary Boiler	Natural Gas Heater	Emergency Generator	Fire Pump	Fugitive Emissions	Facility Total
NO_x	133.9	1.64	0.29	2.92	0.30	N/A	139.1
CO	133.8	7.14	0.89	1.60	0.26	N/A	143.6
VOC	48.3	0.78	0.08	0.15	0.02	N/A	49.3
SO_2	24.7	0.29	0.04	0.003	0.0005	N/A	25.1
PM	100.8	0.97	0.12	0.09	0.02	N/A	102.0
PM_{10}	100.8	0.97	0.12	0.09	0.02	N/A	102.0
$PM_{2.5}$	100.8	0.97	0.12	0.09	0.02	N/A	102.0
CO_2e	1,966,937	22,610	2,809	308	49	547	1,993,260
H_2SO_4	8.76	0.02	0.003	0.0002	0.00003	N/A	8.8
Lead (Pb)	1.8E-03	9.5E-05	1.2E-05	1.4E-06	2.3E-07	N/A	0.002
NH_3	49.5	N/A	N/A	N/A	N/A	N/A	49.5
Total HAPS	14.13	0.36	0.05	0.01	0.003	N/A	14.6

NTE Connecticut, LLC - Killingly Energy Center
CTG Potential To Emit

Potential To Emit Operating Scenario

The CTG will operate at full rated load for 8,760 hours per year.
Higher emission rates occur during gas firing with duct firing and ULSD firing without duct firing
Duct firing will be unlimited
ULSD firing will be limited to 720 hours per year per turbine without duct firing
Over the course of 8,760 operating hours, the average annual temperature will be 59°F
ULSD firing expected to occur during cold winter months
ULSD emission rate for 720 hrs/yr applied when the lb/hr rate is greater than the duct firing lb/hr rate
The potential to emit is the sum of the steady state potential to emit plus the net increase due to startup/shutdown operation

Operating Condition	Operating Load	Fuel	Ambient Temp. (°F)	Duct Firing	Maximum Annual Hours
Case #36	100%	Nat. Gas	59	On	8,760
Case #65	100%	ULSD	-10	Off	720
Total					**8,760**

Pollutant	Case #36	Case #69	8760 PTE	SU/SD	PTE
	lb/hr	lb/hr	tpy	tpy	tpy
NO_x	28.4	54.9	133.9	0.0	133.9
CO	14.7	13.4	64.4	69.4	133.8
VOC	9.9	7.7	43.4	4.9	48.3
$PM_{10}/PM_{2.5}$	22.4	30.0	100.8	0	100.8
SO_2	5.6	4.0	24.7	0	24.7
H_2SO_4	2.0	1.5	8.76	0	8.76
CO_2e	448,064	460,328	1,966,937	0	1,966,937
NH_3	10.5	20.3	49.5	0	49.5

NTE Connecticut, LLC - Killingly Energy Center
Siemens Model SGT6-8000H (or equivalent) Combined Cycle Combustion Turbine Emissions Estimates

Ambient Temperature (°F):	**100**					**59**					**-10**			
Case #:	**1**	**2**	**3**	**4**	**5**	**36**	**37**	**38**	**39**	**40**	**32**	**33**	**34**	**35**
Fuel	**Natural Gas**													
Number of GTs Operating														
GT Operating Load	100%	100%	100%	75%	45%	100%	100%	100%	75%	40%	100%	100%	75%	40%
Fuel Heating Value, Btu/lb (HHV)	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150
Evaporative Cooler Status (On or Off)	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Inlet Fogger State (On or Off)														
Ambient Relative Humidity, %	45	45	45	45	45	60	60	60	60	60	100	100	100	100
Baromteric Pressure, psia	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52
GT Heat Input (MMBtu/hr/unit, HHV)	2,672	2,672	2,490	1,983	1,444	2,871	2,869	2,827	2,269	1,515	2,974	2,971	2,380	1,598
DB Heat Input (MMBtu/hr/unit, HHV)	834					895					920			
Net Power (kW)						532,724		433,008						
Gross Power (kW)						549,200		446,400						
Heat Rate (Btu/kW-hr, net, HHV)						7,069		6,529						
HRSG Stack Exhaust Gas														
Exhaust Flow, lb/hr	4,780,636	4,742,975	4,491,475	3,798,752	3,012,719	5,126,628	5,086,165	5,037,546	4,141,668	3,076,733	5,197,878	5,156,718	4,160,194	3,114,531
Stack Temperature, °F	186.0	191.0	188.0	190.0	188.0	185.0	180.0	180.0	178.0	178.0	188.0	180.0	178.0	178.0
Exhaust Flow, acfm	1,360,753	1,352,033	1,271,742	1,077,307	850,706	1,443,471	1,414,751	1,398,751	1,147,081	850,251	1,464,925	1,429,259	1,148,386	857,812
O_2, Vol. %	8.41	11.09	11.33	11.93	12.70	8.74	11.45	11.54	11.85	12.84	8.69	11.46	11.62	12.67
CO_2, Vol. %	5.61	4.34	4.28	4.00	3.64	5.66	4.38	4.36	4.22	3.75	5.80	4.49	4.42	3.92
H_2O, Vol. %	13.83	11.49	10.81	10.28	9.61	11.77	9.39	9.12	8.85	7.98	10.90	8.45	8.31	7.38
N_2, Vol. %	71.32	72.24	72.73	72.93	73.20	72.97	73.91	74.11	74.21	74.56	73.75	74.72	74.78	75.15
Ar, Vol. %	0.84	0.85	0.85	0.86	0.86	0.86	0.87	0.87	0.87	0.87	0.86	0.88	0.88	0.88
MW, lb/lb-mole	27.96	28.10	28.17	28.20	28.24	28.19	28.34	28.36	28.38	28.43	28.30	28.45	28.46	28.51
HRSG Stack Exhaust Gas Emissions														
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
NOx, lb/MMBtu as NO2 (Siemens)	0.0075	0.0075	0.0076	0.0075	0.0074	0.0075	0.0075	0.0075	0.0074	0.0074	0.0075	0.0075	0.0075	0.0074
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
NOx, lb/hr as NO2 (Siemens)	26.40	20.10	18.80	14.80	10.70	28.40	21.60	21.30	16.90	11.20	29.30	22.40	17.80	11.80
NOx, lb/hr as NO2 (Method 19)	25.83	19.69	18.35	14.62	10.64	27.75	21.14	20.83	16.72	11.16	28.69	21.90	17.53	11.78
VOC, ppmvd @ 15% O2 as CH4	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0
VOC ppm (Method 19)	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0
VOC, lb/MMBtu (Siemens)	0.0026	0.0013	0.0013	0.0013	0.0013	0.0026	0.0013	0.0013	0.0013	0.0013	0.0026	0.0013	0.0013	0.0013
VOC, lb/MMBtu as CH4 (EPA Method 19)	0.0026	0.0013	0.0013	0.0013	0.0013	0.0026	0.0013	0.0013	0.0013	0.0013	0.0026	0.0013	0.0013	0.0013
VOC, lb/hr as CH4 (Siemens)	9.20	3.60	3.30	2.60	1.90	9.90	3.80	3.80	3.00	2.00	10.30	3.90	3.10	2.10
VOC, lb/hr as CH4 (Method 19)	9.00	3.43	3.20	2.55	1.85	9.67	3.68	3.63	2.91	1.94	10.00	3.81	3.05	2.05
CO, ppmvd @ 15% O2	1.7	0.9	0.9	0.9	0.9	1.7	0.9	0.9	0.9	0.9	1.7	0.9	0.9	0.9
CO, lb/MMBtu (Siemens)	0.0039	0.0021	0.0021	0.0021	0.0021	0.0039	0.0021	0.0021	0.0021	0.0020	0.0039	0.0021	0.0021	0.0021
CO, lb/MMBtu (EPA Method 19)	0.0038	0.0020	0.0020	0.0020	0.0020	0.0038	0.0020	0.0020	0.0020	0.0020	0.0038	0.0020	0.0020	0.0020
CO, lb/hr (Siemens)	13.70	5.60	5.20	4.10	3.00	14.70	6.00	5.90	4.70	3.10	15.20	6.20	4.90	3.30
CO, lb/hr (Method 19)	13.37	5.39	5.03	4.00	2.91	14.36	5.79	5.71	4.58	3.06	14.85	6.00	4.80	3.23
SO2 ppm (Method 19)	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
SO2, lb/hr (Siemens)	5.00	3.80	3.60	2.90	2.10	5.40	4.10	4.10	3.30	2.20	5.60	4.30	3.40	2.30
SO2, lb/hr (calculated)	5.26	4.01	3.74	2.98	2.17	5.65	4.30	4.24	3.40	2.27	5.84	4.46	3.57	2.40
SO2, lb/MMBtu	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
H2SO4, lb/hr	1.80	1.40	1.30	1.10	0.80	2.00	1.50	1.50	1.20	0.80	2.00	1.60	1.30	0.90
H2SO4, lb/MMBtu	0.00051	0.00052	0.00052	0.00055	0.00055	0.00053	0.00052	0.00053	0.00053	0.00053	0.00051	0.00054	0.00055	0.00056
PM/PM_{10}/$PM_{2.5}$, lb/hr	20.70	11.50	10.90	9.20	8.00	22.40	12.50	12.40	10.20	8.00	22.90	12.80	10.30	8.00
PM/PM_{10}/$PM_{2.5}$, lb/MMBtu	0.0059	0.0043	0.0044	0.0046	0.0055	0.0059	0.0044	0.0044	0.0045	0.0053	0.0059	0.0043	0.0043	0.0050
NH_3, 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
NH_3, lb/MMBtu (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	0.0027	0.0027
NH_3, lb/hr (Siemens)	9.80	7.50	7.00	5.50	4.00	10.50	8.00	7.90	6.30	4.20	10.90	8.30	6.60	4.40
NH_3, lb/hr (Method 19)	9.55	7.28	6.78	5.40	3.93	10.25	7.81	7.70	6.18	4.13	10.60	8.09	6.48	4.35
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	416,712	317,605	295,959	235,752	171,635	447,609	341,057	336,047	269,653	180,065	462,871	353,170	282,827	189,969
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	7.73	5.89	5.49	4.37	3.18	8.30	6.33	6.23	5.00	3.34	8.59	6.55	5.25	3.52
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	0.77	0.59	0.55	0.44	0.32	0.83	0.63	0.62	0.50	0.33	0.86	0.66	0.52	0.35
CO_2e, lb/hr (CH4 GWP = 25, N2O GWP = 298)	417,136	317,927	296,260	235,991	171,810	448,064	341,403	336,388	269,927	180,248	463,341	353,529	283,114	190,162
CO_2e, lb/MMBtu	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0	119.0
CO_2e, lb/MW-hr (gross)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HCOH (lb/hr)	0.767	0.585	0.545	0.434	0.316	0.824	0.628	0.619	0.496	0.332	0.852	0.650	0.521	0.350

NTE Connecticut, LLC - Killingly Energy Cen
Siemens Model SGT6-8000H (or equivalent)

Ambient Temperature (°F):	100				59				-10		
Case #:	**41**	**42**	**43**	**44**	**68**	**69**	**70**	**71**	**65**	**66**	**67**
Fuel	**ULSD**										
Number of GTs Operating											
GT Operating Load	100%	100%	75%	65%	100%	100%	75%	60%	100%	75%	60%
Fuel Heating Value, Btu/lb (HHV)	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444
Evaporative Cooler Status (On or Off)	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status	---	---	---	---	---	---	---	---	---	---	---
Inlet Fogger State (On or Off)											
Ambient Relative Humidity, %	45	45	45	45	60	60	60	60	100	100	100
Baromteric Pressure, psia	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52
GT Heat Input (MMBtu/hr/unit, HHV)	2,740	2,567	2,055	1,874	2,828	2,783	2,226	1,941	2,827	2,289	2,029
DB Heat Input (MMBtu/hr/unit, HHV)											
Net Power (kW)											
Gross Power (kW)											
Heat Rate (Btu/kW-hr, net, HHV)											
HRSG Stack Exhaust Gas											
Exhaust Flow, lb/hr	4,833,827	4,620,398	3,833,176	3,574,417	5,155,459	5,106,515	4,228,784	3,791,268	5,500,484	4,510,924	4,056,678
Stack Temperature, °F	211.0	207.0	202.0	200.0	200.0	199.0	194.0	193.0	212.0	204.0	202.0
Exhaust Flow, acfm	1,409,478	1,336,669	1,098,107	1,020,083	1,463,706	1,446,835	1,187,159	1,060,412	1,577,200	1,276,412	1,143,842
O_2, Vol. %	11.50	11.77	12.24	12.48	12.25	12.34	12.78	13.08	13.13	13.35	13.52
CO_2, Vol. %	5.26	5.17	4.95	4.82	5.15	5.12	4.91	4.75	4.87	4.76	4.67
H_2O, Vol. %	10.88	10.18	9.40	9.08	8.08	7.81	7.13	6.72	5.71	5.32	5.13
N_2, Vol. %	71.52	72.03	72.56	72.76	73.66	73.86	74.32	74.57	75.41	75.68	75.79
Ar, Vol. %	0.84	0.85	0.85	0.85	0.86	0.87	0.87	0.87	0.88	0.89	0.89
MW, lb/lb-mole	28.33	28.39	28.45	28.48	28.62	28.65	28.70	28.73	28.85	28.88	28.89
HRSG Stack Exhaust Gas Emissions											
NOx, 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
NOx, lb/MMBtu as NO2 (Siemens)	0.0178	0.0178	0.0177	0.0176	0.0178	0.0178	0.0177	0.0176	0.0178	0.0176	0.0175
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
NOx, lb/hr as NO2 (Siemens)	48.90	45.80	36.30	32.90	50.40	49.60	39.30	34.10	50.40	40.40	35.60
NOx, lb/hr as NO2 (Method 19)	53.25	49.88	39.93	36.42	54.96	54.08	43.26	37.72	54.9	44.49	39.44
VOC, ppmvd @ 15% O2 as CH4	2.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC ppm (Method 19)	2.0	1.0	2.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC, lb/MMBtu (Siemens)	0.0026	0.0012	0.0025	0.0025	0.0013	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
VOC, lb/MMBtu as CH4 (EPA Method 19)	0.0027	0.0014	0.0027	0.0027	0.0014	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
VOC, lb/hr as CH4 (Siemens)	7.00	3.20	5.20	4.60	3.60	7.00	5.60	4.80	7.20	5.80	5.00
VOC, lb/hr as CH4 (Method 19)	7.42	3.48	5.57	5.08	3.83	7.54	6.03	5.26	7.66	6.20	5.50
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
CO, lb/MMBtu (Siemens)	0.0043	0.0044	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043	0.0044	0.0043	0.0043
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
CO, lb/hr (Siemens)	11.90	11.20	8.90	8.10	12.30	12.10	9.60	8.30	12.30	9.90	8.70
CO, lb/hr (Method 19)	12.97	12.15	9.72	8.87	13.38	13.17	10.53	9.18	13.38	10.83	9.60
SO2 ppm (Method 19)	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
SO2, lb/hr (Siemens)	3.90	3.60	2.90	2.70	4.00	3.90	3.20	2.80	4.00	3.20	2.90
SO2, lb/hr (calculated)	4.11		3.08	2.81	4.24	4.17	3.34	2.91	4.24	3.43	3.04
SO2, lb/MMBtu	0.0015	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
H2SO4, lb/hr	1.40	1.30	1.10	1.00	1.50	1.40	1.20	1.00	1.50	1.20	1.10
H2SO4, lb/MMBtu	0.00051	0.00051	0.00054	0.00053	0.00053	0.00050	0.00054	0.00052	0.00053	0.00052	0.00054
$PM/PM_{10}/PM_{2.5}$, lb/hr	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
$PM/PM_{10}/PM_{2.5}$, lb/MMBtu	0.0109	0.0117	0.0146	0.0160	0.0106	0.0108	0.0135	0.0155	0.0106	0.0131	0.0148
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
NH_3, 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
NH_3, lb/hr (Siemens)	18.10	17.00	13.50	12.20	18.70	18.40	14.60	12.60	18.70	15.00	13.20
NH_3, lb/hr (Method 19)	19.68	18.43	14.76	13.46	20.31	19.99	15.99	13.94	20.30	16.44	14.57
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	444,638	416,510	333,445	304,077	458,908	451,561	361,231	314,929	458,746	371,494	329,315
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	18.12	16.98	13.59	12.39	18.71	18.41	14.72	12.84	18.70	15.14	13.42
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	3.62	3.40	2.72	2.48	3.74	3.68	2.94	2.57	3.74	3.03	2.68
CO_2e, lb/hr (CH4 GWP = 25, N2O GWP = 298)	446,171	417,946	334,595	305,125	460,491	453,118	362,477	316,015	460,328	372,775	330,450
CO_2e, lb/MMBtu	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.8	162.8
CO_2e, lb/MW-hr (gross)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
HCOH (lb/hr)	0.633	0.593	0.474	0.433	0.653	0.642	0.514	0.448	0.653	0.529	0.469

NTE Connecticut, LLC - Killingly Energy Center
Summary of Startup and Shutdown Emissions - Siemens Model SGT6-8000H (or equivalent)

Startup/Shutdown Operating Data

hot starts/unit/gas	208	number/yr	0.50	hrs/event	6	Avg. hrs downtime	6.50	hrs/event
warm starts/unit/gas	42	number/yr	0.58	hrs/event	16	Avg. hrs downtime	16.58	hrs/event
cold starts/unit/gas	0	number/yr	0.58	hrs/event	64	Avg. hrs downtime	64.58	hrs/event
shutdowns/unit/gas	250	number/yr	0.30	hrs/event	N/A	Avg. hrs downtime	N/A	hrs/event
hot starts/unit/ULSD	0	number/yr	0.53	hrs/event	6	Avg. hrs downtime	6.53	hrs/event
warm starts/unit/ULSD	10	number/yr	0.58	hrs/event	16	Avg. hrs downtime	16.58	hrs/event
cold starts/unit/ULSD	0	number/yr	0.58	hrs/event	64	Avg. hrs downtime	64.58	hrs/event
shutdowns/unit/ULSD	10	number/yr	0.30	hrs/event	N/A	Avg. hrs downtime	N/A	hrs/event

Startup/Shutdown Emissions Self-Correcting Analysis

		Natural Gas Start				ULSD Start			
		NOx	CO	VOC	PM	NOx	CO	VOC	PM
Emissions per cold start	lbs	100	470	40	6.8	150	2200	240	20.3
Emissions per warm start	lbs	130	430	40	8.1	170	2300	260	20.4
Emissions per hot start	lbs	110	370	40	6.9	150	1970	260	18.5
Emissions per shutdown	lbs	60	200	60	3.3	130	420	170	11.3
Shutdown/Cold start - duration (w/ downtime)	hrs	64.88	64.88	64.88	64.88	64.88	64.88	64.88	64.88
Shutdown/Warm start - duration (w/ downtime)	hrs	16.88	16.88	16.88	16.88	16.88	16.88	16.88	16.88
Shutdown/Hot start - duration (w/ downtime)	hrs	6.80	6.80	6.80	6.80	6.83	6.83	6.83	6.83
Shutdown/Cold start - avg hourly emissions[1]	lb/hr	2.47	10.33	1.54	0.15	4.32	40.38	6.32	0.49
Shutdown/Warm start - avg hourly emissions[1]	lb/hr	11.25	37.31	5.92	0.67	17.77	161.11	25.47	1.87
Shutdown/Hot start - avg hourly emissions[1]	lb/hr	25.00	83.82	14.71	1.49	40.98	349.76	62.93	4.35
Steady state average hourly (annual)[2]	lb/hr	28.40	14.70	9.90	22.40	54.94	13.38	7.66	30.00
Cold Start Net increase	lb/event	0.0	0.0	0.0	0.0	0.0	1752.0	0.0	0.0
Warm Start Net increase	lb/event	0.0	381.8	0.0	0.0	0.0	2494.1	300.7	0.0
Hot Start Net increase	lb/event	0.0	470.0	32.7	0.0	0.0	2298.6	377.7	0.0
Cold start - self correcting?	lb/hr	yes	yes	yes	yes	yes	no	yes	yes
Warm start - self correcting?	lb/hr	yes	no	yes	yes	yes	no	no	yes
Hot start - self correcting?	lb/hr	yes	no	no	yes	yes	no	no	yes

[1] Includes balance of the hour at the steady state annual average hourly rate
[2] Based upon average annual hourly emissions with 4,250 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/Cold Start	-	-	-	-	0.00	-
Shutdown/Warm Start	-	8.02	-	-	12.47	1.50
Shutdown/Hot Start	-	48.88	3.40	-	0.00	0.00
TOTAL	**0.00**	**56.90**	**3.40**	**0.00**	**12.47**	**1.50**

Note: Maximum of hot start/warm start/transition used for worst case hot start

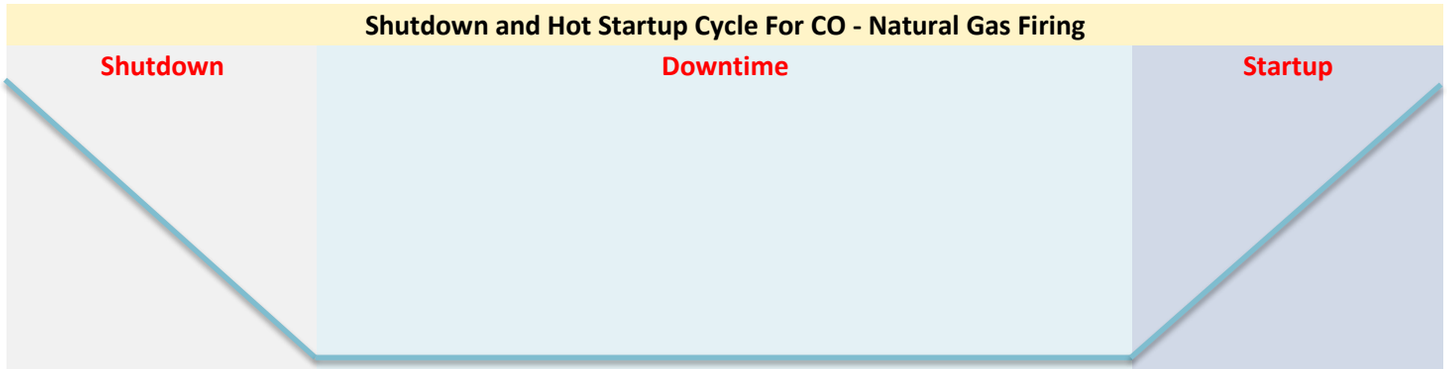
NTE Connecticut, LLC - Killingly Energy Center
Summary of Startup and Shutdown Emissions - Siemens Model SGT6-8000H (or equivalent)

Startup/Shutdown Parameters (per turbine)

Type	Operating Condition	Exhaust Flow (ACFM)	Temp (°F)	Temp (°K)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	PM (lb/hr)	Stack Diameter (ft)	Exit Velocity (m/s)
Hot Start - gas	Startup	1,105,782	175	352.4	124.2	377.4	45.0	18.1	22.5	14.13
Warm Start - gas	Startup	1,161,532	177	353.6	141.8	436.1	44.1	17.5	22.5	14.84
Cold Start - gas	Startup	952,830	174	351.9	111.8	476.1	44.1	16.1	22.5	12.17
Shutdown - gas	Shutdown	807,358	176	353.0	79.9	210.3	66.9	18.9	22.5	10.32
Hot Start - ULSD	Startup	794,409	267	403.6	175.6	1976.2	263.6	32.5	22.5	10.15
Warm Start - ULSD	Startup	862,055	268	404.1	192.9	2305.6	263.2	32.9	22.5	11.01
Cold Start - ULSD	Startup	781,795	267	403.6	172.9	2205.6	243.2	32.8	22.5	9.99
Shutdown - ULSD	Shutdown	778,466	263	401.3	168.5	429.4	175.4	32.3	22.5	9.95

Notes
1.) Data is from vendor estimates with 25% compliance margin applied
2.) Cold startup (SU) data are based on CTG shutdown (SD) >64 hours
3.) Warm SU data CTG SD between 16 and 64 hours
4.) Hot SU data CTG SD <16 hours, 6 hour average presumed based upon daily cycling of CTG
5.) ULSD starts presumed to be Warm starts

Example Calculation of Net Increase in Emissions Due To Shutdown and Startup Operation



	Shutdown	Downtime	Startup	SUSD Totals	
Duration (hrs)	0.30	6.00	0.50	**6.80**	**A**
Emissions (lbs)	200	0	370	**570.0**	**B**

Shutdown and Startup Cycle Emission Rate (lb/hr) =	83.82	**C** = B / A
Full Load Steady State Emission Rate (lb/hr) =	14.70	**D** (Case #36, full load on gas with duct firing at 59°F)
Net Increase in Emissions Due To Shutdown/Startup (lb/hr) =	69.12	**E** = C - D (avg over the shutdown/downtime/startup cycle)

If "E" is less than or equal to zero then there is no net increase in emissions over steady state from shutdown and startup operation.
If "E" is greater than zero, then there is a net increase in emissions over steady state from shutdown and startup operation.
If there is a net increase in emissions, then the impact on potential annual emissions from shutdown and startup must be quantifed.

Calculation of Impact on Potential Annual Emissions Due to a Net Increase in Emissions From Shutdown and Startup Operation

Net Increase in Emissions Due To Shutdown/Startup (lb/event) =	470.04	**F** = E x A
Number of Shutdown and Startup Cycles Per Year =	208	**G**
Net Increase in Annual Emissions (tpy) =	48.88	**H** = F x G / 2000

The net increase in emissions resulting from shutdown and startup operation is added to the steady state potential annual emissions to determine the total potential to emit from the CTG.

NTE Connecticut, LLC - Killingly Energy Center
Emissions From Ancillary Equipment

Pollutant	Auxiliary Boiler	Natural Gas Heater	Emergency Generator	Fire Pump
	84.0 MMBtu/hr	12.0 MMBtu/hr	kW 1,380 (mechanical)	kW 227.5 (mechanical)
NO_x	7 ppmvd @ 3% O_2	10 ppmvd @ 3% O_2	6.40 g/kW-hr	4.0 g/kW-hr
	0.0085 lb/MMBtu	0.012 lb/MMBtu	1.55 lb/MMBtu	1.00 lb/MMBtu
	0.71 lb/hr	0.146 lb/hr	19.46 lb/hr	2.01 lb/hr
	1.64 TPY	0.29 TPY	2.92 TPY	0.30 TPY
CO	50 ppmvd @ 3% O_2	50 ppmvd @ 3% O_2	3.5 g/kW-hr	3.5 g/kW-hr
	0.037 lb/MMBtu	0.037 lb/MMBtu	0.85 lb/MMBtu	0.87 lb/MMBtu
	3.11 lb/hr	0.444 lb/hr	10.64 lb/hr	1.76 lb/hr
	7.14 TPY	0.89 TPY	1.60 TPY	0.263 TPY
VOC	9.6 ppmvd @ 3% O_2	8 ppmvd @ 3% O_2	0.32 g/kW-hr	0.20 g/kW-hr
	0.0041 lb/MMBtu	0.0034 lb/MMBtu	0.078 lb/MMBtu	0.050 lb/MMBtu
	0.34 lb/hr	0.04 lb/hr	0.97 lb/hr	0.100 lb/hr
	0.78 TPY	0.08 TPY	0.15 TPY	0.015 TPY
$PM_{10}/PM_{2.5}$	N/A ppmvd @ 3% O_2	N/A ppmvd @ 3% O_2	0.20 g/kW-hr	0.20 g/kW-hr
	0.005 lb/MMBtu	0.005 lb/MMBtu	0.048 lb/MMBtu	0.050 lb/MMBtu
	0.42 lb/hr	0.06 lb/hr	0.61 lb/hr	0.10 lb/hr
	0.97 TPY	0.12 TPY	0.091 TPY	0.015 TPY
SO_2	0.0015 lb/MMBtu	0.0015 lb/MMBtu	0.0015 lb/MMBtu	0.0015 lb/MMBtu
	0.13 lb/hr	0.0180 lb/hr	0.02 lb/hr	0.0030 lb/hr
	0.29 TPY	0.04 TPY	0.003 TPY	0.0005 TPY
H_2SO_4	0.00011 lb/MMBtu	0.00011 lb/MMBtu	0.00011 lb/MMBtu	0.00011 lb/MMBtu
	0.010 lb/hr	0.00138 lb/hr	0.0014 lb/hr	0.00023 lb/hr
	0.02 TPY	0.00 TPY	0.0002 TPY	0.00003 TPY
Pb	4.9E-07 lb/MMBtu	4.9E-07 lb/MMBtu	1.1E-06 lb/MMBtu	1.1E-06 lb/MMBtu
	4.1E-05 lb/hr	5.9E-06 lb/hr	1.3E-05 lb/hr	2.1E-06 lb/hr
	9.5E-05 TPY	0.00 TPY	2.0E-06 TPY	3.2E-07 TPY
CO_2	116.9 lb/MMBtu	116.9 lb/MMBtu	163.1 lb/MMBtu	163.1 lb/MMBtu
	9,820 lb/hr	1,403 lb/hr	2,046 lb/hr	329 lb/hr
	22,587 TPY	2,806 TPY	307 TPY	49 TPY
CH_4	0.0022 lb/MMBtu	0.0022 lb/MMBtu	0.0066 lb/MMBtu	0.0066 lb/MMBtu
	0.1852 lb/hr	0.0265 lb/hr	0.083 lb/hr	0.013 lb/hr
	0.43 TPY	0.05 TPY	0.0124 TPY	0.0020 TPY
N_2O	0.00022 lb/MMBtu	0.0 lb/MMBtu	0.0013 lb/MMBtu	0.0013 lb/MMBtu
	0.0185 lb/hr	0.0026 lb/hr	1.7E-02 lb/hr	0.0027 lb/hr
	0.043 TPY	0.005 TPY	2.5E-03 TPY	4.0E-04 TPY
CO_2e	9,831 lb/hr	1,404 lb/hr	2,053 lb/hr	330 lb/hr
	22,610 TPY	2,809 TPY	308 TPY	49 TPY

NOTES:

Natural Gas SO2 emissions based upon a sulfur content of 0.5 gr/100 dscf

ULSD SO_2 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.

H_2SO_4 emissions assume a 5% conversion of SO2 --> SO3 (on a molar basis)

Fuel specific CO_2, CH_4 and N_2O emission factors from 40 CFR 98, Subpart C

Pb emission factor for ULSD from "Survey of Ultra-Trace Metals in Gas Turbine Fuels"

Potential HAP Emissions (tpy)

HAP	Potential Annual Emissions (tpy)					TOTALS
	CTGs & Duct Burners	Auxiliary Boiler	Nat. Gas Heater	Em. Generator	Fire Pump	
Organic Compounds						
Acetaldehyde	5.03E-01			4.74E-05	2.32E-04	5.03E-01
Acrolein	8.05E-02			1.48E-05	2.80E-05	8.05E-02
Benzene	1.46E-01	4.06E-04	5.04E-05	1.46E-03	2.82E-04	1.48E-01
1,3-Butadiene	4.96E-03				1.18E-05	4.97E-03
Dichlorobenzene	4.70E-03	2.32E-04	2.88E-05			4.96E-03
Ethylbenzene	4.02E-01					4.02E-01
Formaldehyde	3.05E+00	1.43E-02	1.78E-03	1.48E-04	3.57E-04	3.06E+00
Hexane	7.06E+00	3.48E-01	4.32E-02			7.45E+00
Propylene oxide	3.65E-01			7.24E-03	1.08E-03	3.73E-01
Toluene	1.65E+00	6.38E-04	7.92E-05	5.29E-04	1.24E-04	1.65E+00
Xylene	8.05E-01			3.63E-04	3.66E-04	8.06E-01
PAHs						
Acenaphthene	7.06E-06	3.48E-07	4.32E-08	8.81E-06	4.29E-07	1.67E-05
Acenaphthylene	7.06E-06	4.64E-07	5.76E-08	1.74E-05	1.53E-05	4.02E-05
Anthracene	9.41E-06	3.48E-07	4.32E-08	2.31E-06	5.65E-07	1.27E-05
Benzo(a)anthracene	7.06E-06	3.48E-07	4.32E-08	1.17E-06	5.08E-07	9.13E-06
Benzo(a)pyrene	4.70E-06	2.32E-07	2.88E-08	4.84E-07	5.68E-08	5.51E-06
Benzo(b)fluoranthene	7.06E-06	3.48E-07	4.32E-08	4.10E-07	3.00E-08	7.89E-06
Benzo(g,h,i)perylene	4.70E-06	2.32E-07	2.88E-08	1.05E-06	1.48E-07	6.16E-06
Benzo(k)fluoranthene	7.06E-06	3.48E-07	4.32E-08	2.09E-06	4.68E-08	9.58E-06
Chrysene	7.06E-06	3.48E-07	4.32E-08	2.88E-06	1.07E-07	1.04E-05
Dibenz(a,h)anthracene	4.70E-06	2.32E-07	2.88E-08	6.51E-07	1.76E-07	5.79E-06
7,12-Dimethylbenz(a) an	6.27E-05	3.09E-06	3.84E-07			6.62E-05
Fluoranthene	1.18E-05	5.60E-07	6.96E-08	7.58E-06	2.30E-06	2.23E-05
Fluorene	1.10E-05	5.22E-07	6.48E-08	2.41E-05	8.82E-06	4.45E-05
Indeno(1,2,3-cd)pyrene	7.06E-06	3.48E-07	4.32E-08	7.79E-07	1.13E-07	8.34E-06
3-Methylchloranthrene	7.06E-06	3.48E-07	4.32E-08			7.45E-06
2-Methylnaphthalene	9.41E-05	4.64E-06	5.76E-07			9.93E-05
Naphthalene	1.72E-02	1.20E-04	1.49E-05	2.45E-04	2.56E-05	1.76E-02
Phenanthrene	6.66E-05	3.28E-06	4.08E-07		8.89E-06	7.92E-05
Pyrene	1.96E-05	9.47E-07	1.18E-07	6.98E-06	1.44E-06	2.91E-05
TOTAL PAH	2.79E-02	1.31E-04	1.63E-05	3.99E-04	5.08E-05	2.85E-02
Metals						
Arsenic	7.84E-04	3.86E-05	4.80E-06	8.69E-08	1.40E-08	8.28E-04
Beryllium	4.33E-05	2.32E-06	2.88E-07			4.59E-05
Cadmium	4.31E-03	2.13E-04	2.64E-05	9.65E-09	1.55E-09	4.55E-03
Chromium	5.04E-03	2.70E-04	3.36E-05	2.33E-05	3.75E-06	5.37E-03
Chromium VI	9.07E-04	4.83E-05	6.00E-06	4.21E-06	6.77E-07	9.67E-04
Cobalt	3.21E-04	1.58E-05	1.97E-06			3.39E-04

Potential HAP Emissions (tpy)

HAP	Potential Annual Emissions (tpy)					TOTALS
	CTGs & Duct Burners	Auxiliary Boiler	Nat. Gas Heater	Em. Generator	Fire Pump	
Lead	1.77E-03	9.47E-05	1.18E-05	1.45E-06	2.32E-07	1.88E-03
Manganese	1.62E-03	7.15E-05	8.88E-06	5.31E-07	8.52E-08	1.70E-03
Mercury	9.80E-04	4.83E-05	6.00E-06	1.94E-08	3.11E-09	1.03E-03
Nickel	7.56E-03	4.06E-04	5.04E-05	2.78E-06	4.47E-07	8.02E-03
Selenium	9.54E-05	4.64E-06	5.76E-07	4.82E-07	7.74E-08	1.01E-04
Max. Single HAP						**7.45**
Total All HAPs	**1.41E+01**	**3.65E-01**	**4.53E-02**	**1.06E-02**	**2.60E-03**	**14.55**

NTE Connecticut, LLC - Killingly Energy Center
CTG and Duct Burner Potential HAP Emissions

HAP	CTG and Duct Burner HAP Emissions						
	CTG (gas)		CTG (ULSD)		Duct Burners		Potential To Emit
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	tpy
Organic Compounds							
Acetaldehyde	4.00E-05	1.15E-01					5.03E-01
Acrolein	6.40E-06	1.84E-02					8.05E-02
Benzene	1.20E-05	3.45E-02	5.50E-05	1.56E-01	2.10E-06	1.88E-03	1.46E-01
1,3-Butadiene	4.30E-07	1.23E-03	1.60E-05	4.52E-02			4.96E-03
Dichlorobenzene					1.20E-06	1.07E-03	4.70E-03
Ethylbenzene	3.20E-05	9.19E-02					4.02E-01
Formaldehyde	2.19E-04	6.28E-01	2.31E-04	6.53E-01	7.50E-05	6.71E-02	3.05E+00
Hexane					1.80E-03	1.61E+00	7.06E+00
Propylene oxide	2.90E-05	8.33E-02					3.65E-01
Toluene	1.30E-04	3.73E-01			3.40E-06	3.04E-03	1.65E+00
Xylene	6.40E-05	1.84E-01					8.05E-01
PAHs							
Acenaphthene					1.80E-09	1.61E-06	7.06E-06
Acenaphthylene					1.80E-09	1.61E-06	7.06E-06
Anthracene					2.40E-09	2.15E-06	9.41E-06
Benzo(a)anthracene					1.80E-09	1.61E-06	7.06E-06
Benzo(a)pyrene					1.20E-09	1.07E-06	4.70E-06
Benzo(b)fluoranthene					1.80E-09	1.61E-06	7.06E-06
Benzo(g,h,i)perylene					1.20E-09	1.07E-06	4.70E-06
Benzo(k)fluoranthene					1.80E-09	1.61E-06	7.06E-06
Chrysene					1.80E-09	1.61E-06	7.06E-06
Dibenz(a,h)anthracene					1.20E-09	1.07E-06	4.70E-06
7,12-Dimethylbenz(a) anthracene					1.60E-08	1.43E-05	6.27E-05
Fluoranthene					3.00E-09	2.69E-06	1.18E-05
Fluorene					2.80E-09	2.51E-06	1.10E-05
Indeno(1,2,3-cd)pyrene					1.80E-09	1.61E-06	7.06E-06
3-Methylchloranthrene					1.80E-09	1.61E-06	7.06E-06
2-Methylnaphthalene					2.40E-08	2.15E-05	9.41E-05
Naphthalene	1.30E-06	3.73E-03	3.50E-05	9.90E-02	6.10E-07	5.46E-04	1.72E-02
Phenanthrene					1.70E-08	1.52E-05	6.66E-05
Pyrene					5.00E-09	4.48E-06	1.96E-05
TOTAL PAH	2.20E-06	6.32E-03	4.00E-05	1.13E-01	6.98E-07	6.25E-04	2.79E-02
Metals							
Arsenic			4.60E-08	1.30E-04	2.00E-07	1.79E-04	0.0007841
Beryllium			3.10E-07	8.77E-04	1.20E-08	1.07E-05	4.329E-05
Cadmium			5.11E-09	1.44E-05	1.10E-06	9.85E-04	0.0043123
Chromium			1.24E-05	3.50E-02	1.40E-06	1.25E-03	0.0050412
Chromium VI			2.23E-06	6.30E-03	2.52E-07	2.26E-04	0.0009074
Cobalt					8.20E-08	7.34E-05	0.0003215

NTE Connecticut, LLC - Killingly Energy Center
CTG and Duct Burner Potential HAP Emissions

HAP	CTG and Duct Burner HAP Emissions						
	CTG (gas)		CTG (ULSD)		Duct Burners		Potential To Emit
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	tpy
Lead			1.05E-06	2.97E-03	4.90E-07	4.39E-04	0.0017681
Manganese			1.80E-07	5.10E-04	3.70E-07	3.31E-04	0.0016157
Mercury			1.02E-08	2.89E-05	2.50E-07	2.24E-04	0.0009801
Nickel			1.48E-06	4.17E-03	2.10E-06	1.88E-03	0.0075576
Selenium			2.55E-07	7.22E-04	2.40E-08	2.15E-05	9.535E-05
Max. Single HAP							
Total All HAPs	**5.36E-04**		**3.95E-04**		**1.89E-03**		**1.41E+01**

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 NESHAP Subpart YYYY MACT floor limit of 91 ppb at 15% O2.
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 ULSD firing 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.
7. No reduction by oxidation catalysts presumed for organic HAPs.
8. lb/hr values are at 59°F and do not represent maximum values at higher firing rates at colder temperatures.

NTE Connecticut, LLC - Killingly Energy Center
Ancillary Source Potential HAP Emissions (lb/hr)

HAP	Auxiliary Boiler		Natural Gas Heater		Em. Generator		Fire Pump	
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr
Organic Compounds								
Acetaldehyde					2.52E-05	3.16E-04	7.67E-04	1.55E-03
Acrolein					7.88E-06	9.88E-05	9.25E-05	1.86E-04
Benzene	2.10E-06	1.76E-04	2.10E-06	2.52E-05	7.76E-04	9.73E-03	9.33E-04	1.88E-03
1,3-Butadiene							3.91E-05	7.88E-05
Dichlorobenzene	1.20E-06	1.01E-04	1.20E-06	1.44E-05				
Ethylbenzene								
Formaldehyde	7.40E-05	6.22E-03	7.40E-05	8.88E-04	7.89E-05	9.90E-04	1.18E-03	2.38E-03
Hexane	1.80E-03	1.51E-01	1.80E-03	2.16E-02				
Propylene oxide					3.85E-03	4.83E-02	3.56E-03	7.17E-03
Toluene	3.30E-06	2.77E-04	3.30E-06	3.96E-05	2.81E-04	3.52E-03	4.09E-04	8.24E-04
Xylene					1.93E-04	2.42E-03	2.85E-04	2.44E-03
PAHs								
Acenaphthene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	4.68E-06	5.87E-05	1.42E-06	2.86E-06
Acenaphthylene	2.40E-09	2.02E-07	2.40E-09	2.88E-08	9.23E-06	1.16E-04	5.06E-05	1.02E-04
Anthracene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	1.23E-06	1.54E-05	1.87E-06	3.77E-06
Benzo(a)anthracene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	6.22E-07	7.80E-06	1.68E-06	3.38E-06
Benzo(a)pyrene	1.20E-09	1.01E-07	1.20E-09	1.44E-08	2.57E-07	3.22E-06	1.88E-07	3.79E-07
Benzo(b)fluoranthene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	2.18E-07	2.73E-06	9.91E-08	2.00E-07
Benzo(g,h,i)perylene	1.20E-09	1.01E-07	1.20E-09	1.44E-08	5.56E-07	6.97E-06	4.89E-07	9.85E-07
Benzo(k)fluoranthene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	1.11E-06	1.39E-05	1.55E-07	3.12E-07
Chrysene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	1.53E-06	1.92E-05	3.53E-07	7.11E-07
Dibenz(a,h)anthracene	1.20E-09	1.01E-07	1.20E-09	1.44E-08	3.46E-07	4.34E-06	5.83E-07	1.17E-06
7,12-Dimethylbenz(a) anthracene	1.60E-08	1.34E-06	1.60E-08	1.92E-07				
Fluoranthene	2.90E-09	2.44E-07	2.90E-09	3.48E-08	4.03E-06	5.06E-05	7.61E-06	1.53E-05
Fluorene	2.70E-09	2.27E-07	2.70E-09	3.24E-08	1.28E-05	1.61E-04	2.92E-05	5.88E-05
Indeno(1,2,3-cd)pyrene	1.80E-09	1.51E-07	1.80E-09	2.16E-08	4.14E-07	5.19E-06	3.75E-07	7.56E-07
3-Methylchloranthrene	1.80E-09	1.51E-07	1.80E-09	2.16E-08				
2-Methylnaphthalene	2.40E-08	2.02E-06	2.40E-08	2.88E-07				
Naphthalene	6.20E-07	5.21E-05	6.20E-07	7.44E-06	1.30E-04	1.63E-03	8.48E-05	1.71E-04
Phenanthrene	1.70E-08	1.43E-06	1.70E-08	2.04E-07			2.94E-05	5.92E-05
Pyrene	4.90E-09	4.12E-07	4.90E-09	5.88E-08	3.71E-06	4.65E-05	4.78E-06	9.63E-06
TOTAL PAH	6.80E-07	5.71E-05	6.80E-07	8.16E-06	2.12E-04	2.66E-03	1.68E-04	3.38E-04
Metals								
Arsenic	2.00E-07	1.68E-05	2.00E-07	2.40E-06	4.62E-08	5.80E-07	4.62E-08	9.31E-08
Beryllium	1.20E-08	1.01E-06	1.20E-08	1.44E-07				
Cadmium	1.10E-06	9.24E-05	1.10E-06	1.32E-05	5.13E-09	6.44E-08	5.13E-09	1.03E-08
Chromium	1.40E-06	1.18E-04	1.40E-06	1.68E-05	1.24E-05	1.56E-04	1.24E-05	2.50E-05
Chromium VI	2.50E-07	2.10E-05	2.50E-07	3.00E-06	2.24E-06	2.81E-05	2.24E-06	4.51E-06
Cobalt	8.20E-08	6.89E-06	8.20E-08	9.84E-07				
Lead	4.90E-07	4.12E-05	4.90E-07	5.88E-06	7.69E-07	9.65E-06	7.69E-07	1.55E-06
Manganese	3.70E-07	3.11E-05	3.70E-07	4.44E-06	2.82E-07	3.54E-06	2.82E-07	5.68E-07
Mercury	2.50E-07	2.10E-05	2.50E-07	3.00E-06	1.03E-08	1.29E-07	1.03E-08	2.08E-08
Nickel	2.10E-06	1.76E-04	2.10E-06	2.52E-05	1.48E-06	1.86E-05	1.48E-06	2.98E-06
Selenium	2.40E-08	2.02E-06	2.40E-08	2.88E-07	2.56E-07	3.21E-06	2.56E-07	5.16E-07
Max. Single HAP								
Total All HAPs	**1.89E-03**	**1.59E-01**	**1.89E-03**	**2.27E-02**	**5.61E-03**	**7.04E-02**	**7.66E-03**	**1.73E-02**

NTE Connecticut, LLC - Killingly Energy Center
CTG and Duct Burner Maximum Potential MASC Toxic Emissions

HAP	CTG and Duct Burner MASC Toxic Emissions						
	CTG (gas)		Duct Burners		CTG + Duct Burners	CTG (ULSD)	
	lb/MMBtu	lb/hr	lb/MMBtu	lb/hr	lb/hr	lb/MMBtu	lb/hr
Organic Compounds							
Acetaldehyde	4.00E-05	1.19E-01			1.19E-01		
Acrolein	6.40E-06	1.90E-02			1.90E-02		
Benzene	1.20E-05	3.57E-02	2.10E-06	1.93E-03	3.76E-02	5.50E-05	1.55E-01
Dichlorobenzene			1.20E-06	1.10E-03	1.10E-03		
Ethylbenzene	3.20E-05	9.52E-02			9.52E-02		
Formaldehyde	2.19E-04	6.51E-01	7.50E-05	6.90E-02	7.20E-01	2.31E-04	6.53E-01
Hexane			1.80E-03	1.66E+00	1.66E+00		
Toluene	1.30E-04	3.87E-01	3.40E-06	3.13E-03	3.90E-01		
Xylene	6.40E-05	1.90E-01			1.90E-01		
PAHs							
Naphthalene	1.30E-07	3.87E-04	6.10E-08	5.61E-05	4.43E-04	3.50E-06	9.89E-03
TOTAL PAH	2.20E-07	6.54E-04	6.98E-08	6.42E-05	7.19E-04	4.00E-06	1.13E-02
Metals							
Arsenic			2.00E-07	1.84E-04	1.84E-04	4.60E-08	1.30E-04
Cadmium			1.10E-06	1.01E-03	1.01E-03	5.11E-09	1.44E-05
Chromium			1.40E-06	1.29E-03	1.29E-03	1.24E-05	3.50E-02
Cobalt			8.20E-08	7.54E-05	7.54E-05		
Lead			4.90E-07	4.51E-04	4.51E-04	1.05E-06	2.97E-03
Manganese			3.70E-07	3.40E-04	3.40E-04	1.80E-07	5.10E-04
Mercury			2.50E-07	2.30E-04	2.30E-04	1.02E-08	2.89E-05
Nickel			2.10E-06	1.93E-03	1.93E-03	1.48E-06	4.17E-03
Selenium						2.55E-07	7.22E-04

Notes:
1. Only emission factors reported above their detection limited in AP-42 used in the analysis.
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 NESHAP Subpart YYYY MACT floor limit of 91 ppb at 15% O2.
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 ULSD firing 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.
7. No reduction by oxidation catalysts presumed for organic HAPs except for PAHs where a 90% efficiency is taken into account for polycyclic compounds.
8. lb/hr values are at 59°F and do not represent maximum values at higher firing rates at colder temperatures.

NTE Connecticut, LLC - Killingly Energy Center
Summary of Estimated Fugitive GHG Emissions

Circuit Breaker SF6 Emissions

SF6 Storage Capacity	111	lbs
SF6 Leak Rate	0.5%	per year
SF6 emissions	0.555	lbs/year
GHG emissions (CO2e)	**6.3**	**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

NTE Connecticut, LLC - Killingly Energy Center
Summary of Baseline Emissions

SUMMARY OF BASELINE EMISSION RATES AND REDUCTIONS

Pollutant	Combustion Turbine				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	5278	133.9	5144	0.10	16.8	1.6	15.2
CO	0.082	1352.6	64.4	1288.2	0.084	14.1	7.1	7.0
VOC	0.0021	34.6	4.9	29.7	0.0055	0.92	0.78	0.1
GHGs[8]	119	2,866,710	1,966,937	899,773	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] Baseline calculated from gas firing at 59F of 2,827 MMBtu/hr (CT) and 895 MMBtu/hr (DB) 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 84 MMBtu/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 550MW firing gas

APPENDIX B: REVISED AMBIENT AIR QUALITY ANALYSIS REPORT PAGES

Table L-2 PSD Regulatory Threshold Evaluation

Table L-5. Load Scenarios and Emission Rates - Combined Cycle Combustion Turbine Firing Natural Gas

Table L-7. Startup Condition Stack Parameters for Each Fuel

Table L-8. Stack Parameters for Ancillary Equipment

Table L-10. Maximum Predicted Impact Concentrations

Table L-15. Predicted Air Quality Impacts Compared to SO_2 and PM_{10} Vegetation Impact Thresholds

Appendix L-A: DETAILED SOURCE PARAMETER DATA,

- **Combined Cycle Combustion Turbine and Ancillary Equipment Emissions Estimates**

Appendix L-C: DETAILED AERMOD RESULTS SUMMARY,

- **Combined Cycle Combustion Turbine Emissions Estimates,**
- **AERMOD Scaled Impacts – turbine only (ug/m3) – 150 ft. turbine stack,**
- **Combined Cycle Combustion Turbine – Start-up/Shutdown (SU/SD) Emissions Estimates**
- **AERMOD SU/SD Scaled Impacts – turbine only (ug/m3) – 150 ft. turbine stack**
- **Killingly Energy Center – Detailed Results Table**

Table L-2. PSD Regulatory Threshold Evaluation

Pollutant	Project Annual **Potential** Emissions (tpy)	PSD Major Source Threshold (tpy)	PSD Significant Emission Rate (tpy)	PSD Review Applies
CO[a]	143.6	100	100	Yes
NO_x[a]	139.1	100	40	Yes
SO_2	25.1	100	40	No
PM	102.0	100	25	Yes
PM_{10}	102.0	100	15	Yes
$PM_{2.5}$	102.0	100	10	Yes
VOC[a]	49.3	100	40	Yes
Pb	0.002	100	0.6	No
H_2SO_4	8.8	100	7	Yes
GHGs (as CO_2e)	1,992,260[b]	N/A	75,000	Yes

[a] Includes incremental emissions due to startup and shutdown.
[b] Incudes 547 tpy of fugitive GHG emissions from circuit breakers and natural gas handling.
CO_2e = carbon dioxide equivalents

Table L-5. Load Scenarios and Emission Rates - Combined Cycle Combustion Turbine Firing Natural Gas

Parameter	Units	Natural Gas													
		100 °F					59°F					-10°F			
		1	2	3	4	5	36	37	38	39	40	32	33	34	35
GT Operating Load		100%	100%	100%	75%	45%	100%	100%	100%	75%	40%	100%	100%	75%	40%
Fuel Higher Heating Value (HHV)	Btu/lb	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150
Evaporative Cooler Status	On or Off	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status	On or Off	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Exhaust velocity	m/s	17.39	17.27	16.25	13.76	10.87	18.44	18.08	17.87	14.66	10.86	18.72	18.26	14.67	10.96
Exhaust temperature	K	358.7	361.5	359.8	360.9	359.8	358.2	355.4	355.4	354.3	354.3	359.8	355.4	354.3	354.3
NO_X	g/s	3.326	2.533	2.369	1.865	1.348	3.578	2.722	2.684	2.129	1.411	3.692	2.822	2.243	1.487
CO	g/s	1.726	0.706	0.655	0.517	0.378	1.852	0.756	0.743	0.592	0.391	1.915	0.781	0.617	0.416
PM	g/s	2.608	1.449	1.373	1.159	1.008	2.822	1.575	1.562	1.285	1.008	2.885	1.613	1.298	1.008
SO_2	g/s	0.630	0.479	0.454	0.365	0.265	0.680	0.517	0.517	0.416	0.277	0.706	0.542	0.428	0.290
Btu/lb = British thermal units per pound; g/s = grams per second; K = degrees Kelvin															

Table L-7. Startup Condition Stack Parameters for Each Fuel

Parameter	Units	Startup / Shutdown							
		Natural Gas				ULSD			
		Hot Start	Warm Start	Cold Start	Shutdown	Hot Start	Warm Start	Cold Start	Shutdown
Exhaust velocity	m/s	14.13	14.84	12.17	10.32	10.15	11.01	9.99	9.95
Exhaust temperature	K	352.4	353.6	351.9	353.0	403.6	404.1	403.6	401.3
NO_X	g/s	15.649	17.871	14.091	10.065	22.130	24.304	21.784	21.226
CO	g/s	47.546	54.952	59.992	26.497	249.007	290.502	277.902	54.100
PM	g/s	2.277	2.200	2.027	2.385	4.095	4.142	4.127	4.064
SO_2	g/s	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788
m/s = meters per second									

Table L-8. Stack Parameters for Ancillary Equipment

Parameter	Time	Auxiliary Boiler	Emergency Generator	Fire Pump	Natural Gas Heater
Exhaust velocity (m/s)		8.29	31.19	7.12	17.46
Exhaust temperature (K)		422.0	722.0	789.3	394.3
NO_X (g/s)	1-hour	0.089	2.223	0.253	0.017
	Annual	0.0467	0.076	0.0087	0.0075
CO (g/s)	1-hour	0.392	1.216	0.222	0.056
	8-hour	0392	0.152	0.028	0.056
PM (g/s)	1-hour	0.053	0.069	0.013	0.008
	24-hour	0.053	0.0029	0.0005	0.008
	Annual	0.0278	0.0024	0.00048	0.0035
SO_2 (g/s)	1-hour	0.016	0.0025	0.00038	0.0023
	3-hour	0.016	0.00084	0.00013	0.0023
	24-hour	0.016	0.00011	0.00002	0.0023
	Annual	.0084	0.00009	0.00001	0.0011

Table L-10. Maximum Predicted Impact Concentrations

Pollutant	Averaging Period	Rank Basis for SIL Assessment	Impact Concentration ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Extent of SIA (km)	NAAQS ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
NO_2 (Normal Load)	1-hour	H1H (5-year Average)	21.07	7.5	20.2	188	NA
	Annual	H1H	0.93	1	NA	100	25
NO_2 (SUSD)	1-hour	H1H (5-year Average)	84.31	NA	NA	188	NA
	Annual	H1H	0.93	NA	NA	100	25
CO	1-hour	H1H	1,427	2,000	NA	40,000	NA
	8-hour	H1H	131	500	NA	10,000	NA
PM_{10}	24-hour	H1H	3.96	5	NA	150	30
	Annual	H1H	0.35	1	NA	NA	17
$PM_{2.5}$	24-hour	H1H (5-year Average)	3.15	1.2	8.05	35	9
	Annual	H1H (5-year Average)	0.29	0.3	NA	12	4
SO_2	1-hour	H1H (5-year Average)	2.92	7.8	NA	196	NA
	3-hour	H1H	1.51	25	NA	1300	512
	24-hour	H1H	0.99	5	NA	365	91
	Annual	H1H	0.09	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 assume NO_x to NO_2 conversion at 80% (short term) and 75% (annual). $PM_{2.5}$ 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.

SIA = Significant Impact Area, defined as a circle with a radius equal to the distance to the furthest receptor for which the maximum predicted impact exceeds the SIL.

Table L-15. Predicted Air Quality Impacts Compared to SO_2 and PM_{10} Vegetation Impact Thresholds

Averaging Period	Maximum Project Impacts (µg/m³)	Threshold for Impact to Vegetation (µg/m³)	Applicability
SO_2			
1-hour SO_2	2.9	131[a]	Suggested worst-case limit
3-hour SO_2	1.5	390[b]	Protects SO_2 sensitive species
3-hour SO_2		1,300[c]	Protects all vegetation
24-hour SO_2	1.0	63[d]	Insignificant effect to wheat and barley
Annual SO_2	0.1	130[b]	Protects SO_2 sensitive species
PM_{10}			
24-hour PM_{10}	4.0	150[c]	Protects all vegetation
Annual PM_{10}	0.35	50[c]	Protects all vegetation
Annual PM_{10}		579[e]	Damage to sensitive species (fir tree)

a. "Crop and Forest Losses due to Current and Projected Emissions from Coal-Fired Power Plants in the Ohio River Basin" Loucks, O.L., R.W. Miller, et al. 1980. The Institute of Ecology. In this publication, the authors propose 1-hour thresholds from 131 to 262 µg/m³.

b. "Impacts of Coal-fired Power Plants on Fish, Wildlife, and their Habitats" Dvorak, A.J., et al. Argonne National Laboratory. Argonne, Illinois. Fish and Wildlife Service Publication No. FWS/OBS-78/29. March 1978. This document indicates the lowest 3-hour SO_2 concentration expected to cause injury to sensitive plants growing under compromised conditions is approximately 390 µg/m³. Similarly, a threshold of 130 µg/m³ is suggested for chronic exposure.

c. Secondary National Ambient Air Quality Standard (µg/m³) which is a limit set to avoid damage to vegetation resulting in economic losses in commercial crops, aesthetic damage to cultivated trees, shrubs, and other ornamentals, and reductions in productivity, species richness, and diversity in natural ecosystems to protect public welfare (Section 109 of the Clean Air Act). These thresholds are the most stringent of those found in the literature survey.

d. "Concurrent Exposure to SO_2 and/or NO_2 Alters Growth and Yield Responses of Wheat and Barley to Low Concentrations of O_3" (New Phytologist, 118 (4). 1991. pp. 581-592). This paper indicates exposure to 63 µg/m³ of SO_2 during the growing season had insignificant effects to wheat but did affect the weight of Barley seeds.

e. "Responses of Plants to Air Pollution" Lerman, S.L., and E.F. Darley. 1975. "Particulates," pp. 141-158 (Chap. 7). In J.B. Mudd and T.T. Kozlowski (eds.). Academic Press. New York, NY. Results of studies conducted indicated concluded that particulate deposition rates of 365 g/m²/yr caused damage to fir trees, but rates of 274 g/m²/year and 400 to 600 g/m²/yr did not cause damage to vegetation. 365 g/m²/yr translates to W579 µg/m³, using a worst-case deposition velocity of 2 centimeters per second.

NTE Killingly Energy Center

Siemens Model SGT6-8000H (or equivalent) Combined Cycle Combustion Turbine and Ancillary Equipment Emissions Estimates

	Combustion Turbines													
Case #:	**1**	**2**	**3**	**4**	**5**	**36**	**37**	**38**	**39**	**40**	**32**	**33**	**34**	**35**
Fuel	**Natural Gas**													
Ambient Temperature (°F):	100	100	100	100	100	59	59	59	59	59	-10	-10	-10	-10
GT Operating Load	100%	100%	100%	75%	45%	100%	100%	100%	75%	40%	100%	100%	75%	40%
Fuel Heating Value, Btu/lb (HHV)	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150
Evaporative Cooler Status (On or	ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Ambient Relative Humidity, %	45	45	45	45	45	60	60	60	60	60	100	100	100	100
Baromteric Pressure, psia	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52
GT Heat Input (MMBtu/hr/unit, HH	2,672	2,672	2,490	1,983	1,444	2,871	2,869	2,827	2,269	1,515	2,974	2,971	2,380	1,598
DB Heat Input (MMBtu/hr/unit, HH	834	0	0	0	0	895	0	0	0	0	920	0	0	0
Exhaust velocity (m/s)	17.39	17.27	16.25	13.76	10.87	18.44	18.08	17.87	14.66	10.86	18.72	18.26	14.67	10.96
Exhaust temperature (K)	358.71	361.48	359.82	360.93	359.82	358.15	355.37	355.37	354.26	354.26	359.82	355.37	354.26	354.26
NOx (g/s)	3.326	2.533	2.369	1.865	1.348	3.578	2.722	2.684	2.129	1.411	3.692	2.822	2.243	1.487
CO (g/s)	1.726	0.706	0.655	0.517	0.378	1.852	0.756	0.743	0.592	0.391	1.915	0.781	0.617	0.416
PM (g/s)	2.608	1.449	1.373	1.159	1.008	2.822	1.575	1.562	1.285	1.008	2.885	1.613	1.298	1.008
SO2 (g/s)	0.630	0.479	0.454	0.365	0.265	0.680	0.517	0.517	0.416	0.277	0.706	0.542	0.428	0.290

	Combustion Turbines										
Case #:	**41**	**42**	**43**	**44**	**68**	**69**	**70**	**71**	**65**	**66**	**67**
Fuel	**ULSD**										
Ambient Temperature (°F):	100	100	100	100	59	59	59	59	-10	-10	-10
GT Operating Load	100%	100%	75%	65%	100%	100%	75%	60%	100%	75%	60%
Fuel Heating Value, Btu/lb (HHV)	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444
Evaporative Cooler Status (On or	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status	---	---	---	---	---	---	---	---	---	---	---
Ambient Relative Humidity, %	45	45	45	45	60	60	60	60	100	100	100
Baromteric Pressure, psia	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52
GT Heat Input (MMBtu/hr/unit, HH	2,740	2,567	2,055	1,874	2,828	2,783	2,226	1,941	2,827	2,289	2,029
DB Heat Input (MMBtu/hr/unit, HH	0	0	0	0	0	0	0	0	0	0	0
Exhaust velocity (m/s)	18.01	17.08	14.03	13.03	18.70	18.49	15.17	13.55	20.15	16.31	14.61
Exhaust temperature (K)	372.59	370.37	367.59	366.48	366.48	365.93	363.15	362.59	373.15	368.71	367.59
NOx (g/s)	6.709	6.285	5.032	4.588	6.925	6.814	5.451	4.752	6.922	5.606	4.969
CO (g/s)	1.634	1.530	1.225	1.117	1.686	1.659	1.327	1.157	1.686	1.365	1.210
PM (g/s)	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780
SO2 (g/s)	0.491	0.454	0.365	0.340	0.504	0.491	0.403	0.353	0.504	0.403	0.365

	Start-Up and Shutdown								Ancillary Equipment			
Case #:	**Hot Start**	**Warm Start**	**Cold Start**	**Shutdown**	**Hot Start**	**Warm Start**	**Cold Start**	**Shutdown**	**Auxiliary Boiler**	**Emergency Generator**	**Fire Pump**	**Gas Heater**
Fuel	**Natural Gas**				**ULSD**							
Exhaust velocity (m/s)	14.128	14.840	12.174	10.315	10.150	11.014	9.989	9.946	8.287	31.185	7.115	17.464
Exhaust temperature (K)	352.444	353.556	351.889	353.000	403.556	404.111	403.556	401.333	422.039	722.039	789.261	394.261
NOx (g/s)	15.649	17.871	14.091	10.065	22.130	24.304	21.784	21.226	0.089	2.223	0.253	0.017
CO (g/s)	47.546	54.952	59.992	26.497	249.007	290.502	277.902	54.100	0.392	1.216	0.222	0.056
PM (g/s)	2.277	2.200	2.027	2.385	4.095	4.142	4.127	4.064	0.053	0.069	0.013	0.008
SO2 (g/s)	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.016	0.003	0.000	0.002

NTE Killingly Energy Center

Siemens Model SGT6-8000H (or equivalent) Combined Cycle Combustion Turbine Emissions Estimates

Ambient Temperature (°F):		**100**							**59**				**-10**			**100**					**59**				**-10**		
Case #:		**1**	**2**	**3**	**4**	**5**	**36**	**37**	**38**	**39**	**40**	**32**	**33**	**34**	**35**	**41**	**42**	**43**	**44**	**68**	**69**	**70**	**71**	**65**	**66**	**67**
Fuel		**Natural Gas**														**ULSD**										
Number of GTs Operating																											
GT Operating Load		100%	100%	100%	75%	45%	100%	100%	100%	75%	40%	100%	100%	75%	40%	100%	100%	75%	65%	100%	100%	75%	60%	100%	75%	60%
Fuel Heating Value, Btu/lb (HHV)		22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	22,150	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444	20,444
Evaporative Cooler Status (On or Off)		ON	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Duct Burner Status		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	---	---	---	---	---	---	---	---	---	---	---
Ambient Relative Humidity, %		45	45	45	45	45	60	60	60	60	60	100	100	100	100	45	45	45	45	60	60	60	60	100	100	100
Baromteric Pressure, psia		14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52	14.52
GT Heat Input (MMBtu/hr/unit, HHV)		2,672	2,672	2,490	1,983	1,444	2,871	2,869	2,827	2,269	1,515	2,974	2,971	2,380	1,598	2,740	2,567	2,055	1,874	2,828	2,783	2,226	1,941	2,827	2,289	2,029
DB Heat Input (MMBtu/hr/unit, HHV)		834	0	0	0	0	895	0	0	0	0	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exhaust velocity (m/s)		17.39	17.27	16.25	13.76	10.87	18.44	18.08	17.87	14.66	10.86	18.72	18.26	14.67	10.96	18.01	17.08	14.03	13.03	18.70	18.49	15.17	13.55	20.15	16.31	14.61
Exhaust temperature (K)		358.71	361.48	359.82	360.93	359.82	358.15	355.37	355.37	354.26	354.26	359.82	355.37	354.26	354.26	372.59	370.37	367.59	366.48	366.48	365.93	363.15	362.59	373.15	368.71	367.59
NOx (g/s)		3.326	2.533	2.369	1.865	1.348	3.578	2.722	2.684	2.129	1.411	3.692	2.822	2.243	1.487	6.709	6.285	5.032	4.588	6.925	6.814	5.451	4.752	6.922	5.606	4.969
CO (g/s)		1.726	0.706	0.655	0.517	0.378	1.852	0.756	0.743	0.592	0.391	1.915	0.781	0.617	0.416	1.634	1.530	1.225	1.117	1.686	1.659	1.327	1.157	1.686	1.365	1.210
PM (g/s)		2.608	1.449	1.373	1.159	1.008	2.822	1.575	1.562	1.285	1.008	2.885	1.613	1.298	1.008	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780	3.780
SO2 (g/s)		0.630	0.479	0.454	0.365	0.265	0.680	0.517	0.517	0.416	0.277	0.706	0.542	0.428	0.290	0.491	0.454	0.365	0.340	0.504	0.491	0.403	0.353	0.504	0.403	0.365
AERMOD Impacts - turbine only (ug/m3 per g/s) - 150 ft. turbine stack height																										
Unit	1-hour H1H	3.880	3.854	3.913	4.234	5.076	3.834	3.887	3.894	4.283	5.322	3.792	3.879	4.281	5.287	3.626	3.743	4.015	4.214	3.676	3.704	3.958	4.226	3.409	3.822	3.917
	1-hour H2H	3.759	3.676	3.893	4.161	5.003	3.623	3.784	3.813	4.199	5.293	3.520	3.757	4.197	5.254	3.225	3.412	3.982	4.188	3.288	3.338	3.935	4.170	2.915	3.590	3.913
	3-hour H1H	2.074	2.055	2.122	2.217	2.479	2.023	2.070	2.080	2.219	2.550	1.992	2.060	2.219	2.537	1.909	1.987	2.175	2.218	1.925	1.944	2.150	2.217	1.770	2.048	2.148
	3-hour H2H	1.773	1.768	1.837	2.040	2.394	1.756	1.771	1.774	2.047	2.485	1.728	1.768	2.046	2.471	1.650	1.721	1.936	2.041	1.657	1.676	1.886	2.039	1.598	1.767	1.884
	8-hour H1H	1.147	1.135	1.239	1.539	2.035	1.075	1.120	1.134	1.476	2.103	1.046	1.105	1.474	2.086	1.020	1.096	1.441	1.591	1.009	1.026	1.328	1.553	0.886	1.166	1.361
	8-hour H2H	1.015	1.007	1.101	1.343	1.776	0.951	0.996	1.005	1.308	1.859	0.929	0.983	1.306	1.838	0.883	0.958	1.249	1.374	0.885	0.897	1.174	1.350	0.781	1.028	1.187
	24-hour H1H	0.660	0.653	0.719	0.902	1.225	0.608	0.640	0.650	0.865	1.271	0.585	0.629	0.864	1.262	0.565	0.621	0.837	0.935	0.557	0.569	0.771	0.912	0.467	0.673	0.788
	24-hour H2H	0.458	0.453	0.502	0.660	0.948	0.422	0.447	0.453	0.638	1.001	0.409	0.441	0.636	0.990	0.384	0.427	0.595	0.681	0.384	0.392	0.550	0.665	0.321	0.463	0.558
	24-hour H6H	0.370	0.365	0.405	0.511	0.666	0.328	0.357	0.359	0.493	0.696	0.311	0.345	0.487	0.686	0.295	0.341	0.473	0.514	0.286	0.300	0.447	0.509	0.227	0.373	0.444
	Annual	0.035	0.035	0.039	0.049	0.067	0.033	0.035	0.036	0.048	0.072	0.031	0.035	0.048	0.071	0.029	0.032	0.043	0.049	0.029	0.030	0.041	0.049	0.025	0.034	0.041

AERMOD Scaled Impacts - turbine only (ug/m3) - 150 ft. turbine stack

Fuel		**Natural Gas**														**ULSD**										
Case #:	**Averaging Period**	**1**	**2**	**3**	**4**	**5**	**36**	**37**	**38**	**39**	**40**	**32**	**33**	**34**	**35**	**41**	**42**	**43**	**44**	**68**	**69**	**70**	**71**	**65**	**66**	**67**
NO2	1-hour H1H	9.40	7.06	6.98	6.07	5.17	9.82	7.71	7.67	7.00	5.68	9.94	7.93	7.37	5.94	17.04	16.74	15.48	14.94	17.85	17.76	16.42	15.47	16.15	15.48	14.87
	1-hour H8H	6.45	4.85	4.80	4.15	3.49	6.75	5.26	5.23	4.74	3.79	6.87	5.42	4.99	3.97	11.65	11.65	10.65	10.21	12.32	12.30	11.33	10.56	11.00	10.70	10.29
	Annual	0.12	0.09	0.09	0.09	0.09	0.12	0.10	0.10	0.10	0.10	0.12	0.10	0.11	0.11	0.19	0.20	0.22	0.22	0.20	0.20	0.22	0.23	0.17	0.19	0.20
CO	1-hour H1H	6.70	2.72	2.56	2.19	1.92	7.10	2.94	2.90	2.54	2.08	7.26	3.03	2.64	2.20	5.92	5.73	4.92	4.71	6.20	6.15	5.25	4.89	5.75	5.22	4.74
	1-hour H2H	6.49	2.59	2.55	2.15	1.89	6.71	2.86	2.83	2.49	2.07	6.74	2.93	2.59	2.18	5.27	5.22	4.88	4.68	5.54	5.54	5.22	4.83	4.91	4.90	4.74
	8-hour H1H	1.98	0.80	0.81	0.80	0.77	1.99	0.85	0.84	0.87	0.82	2.00	0.86	0.91	0.87	1.67	1.68	1.77	1.78	1.70	1.70	1.76	1.80	1.49	1.59	1.65
	8-hour H2H	1.75	0.71	0.72	0.69	0.67	1.76	0.75	0.75	0.77	0.73	1.78	0.77	0.81	0.76	1.44	1.47	1.53	1.54	1.49	1.49	1.56	1.56	1.32	1.40	1.44
PM10	24-hour H1H	1.72	0.95	0.99	1.05	1.24	1.72	1.01	1.02	1.11	1.28	1.69	1.01	1.12	1.27	2.14	2.35	3.16	3.54	2.11	2.15	2.92	3.45	1.77	2.54	2.98
	24-hour H2H	1.19	0.66	0.69	0.77	0.96	1.19	0.70	0.71	0.82	1.01	1.18	0.71	0.83	1.00	1.45	1.62	2.25	2.58	1.45	1.48	2.08	2.51	1.21	1.75	2.11
	24-hour H6H	0.96	0.53	0.56	0.59	0.67	0.93	0.56	0.56	0.63	0.70	0.90	0.56	0.63	0.69	1.12	1.29	1.79	1.94	1.08	1.13	1.69	1.92	0.86	1.41	1.68
	Annual	0.09	0.05	0.05	0.06	0.07	0.09	0.06	0.06	0.06	0.07	0.09	0.06	0.06	0.07	0.11	0.12	0.16	0.18	0.11	0.11	0.15	0.18	0.09	0.13	0.16
PM2.5	24-hour H1H	0.94	0.51	0.55	0.60	0.74	0.91	0.54	0.55	0.64	0.77	0.90	0.54	0.64	0.77	1.13	1.27	1.81	2.01	1.10	1.15	1.66	1.97	0.93	1.40	1.69
	24-hour H8H	0.44	0.24	0.25	0.27	0.32	0.44	0.26	0.26	0.29	0.34	0.43	0.26	0.30	0.34	0.53	0.57	0.78	0.88	0.53	0.54	0.72	0.87	0.46	0.63	0.72
	Annual	0.07	0.04	0.04	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.07	0.04	0.05	0.06	0.08	0.09	0.13	0.14	0.08	0.08	0.12	0.14	0.07	0.10	0.12
SO2	1-hour H1H	2.23	1.67	1.67	1.48	1.27	2.33	1.83	1.85	1.71	1.39	2.38	1.90	1.76	1.45	1.56	1.51	1.40	1.38	1.62	1.60	1.52	1.44	1.47	1.39	1.37
	1-hour H4H	1.86	1.39	1.39	1.24	1.08	1.93	1.53	1.54	1.42	1.18	1.96	1.59	1.46	1.22	1.30	1.26	1.17	1.16	1.35	1.32	1.26	1.20	1.24	1.16	1.14
	3-hour H1H	1.31	0.98	0.96	0.81	0.66	1.38	1.07	1.07	0.92	0.71	1.41	1.12	0.95	0.74	0.94	0.90	0.79	0.75	0.97	0.96	0.87	0.78	0.89	0.83	0.78
	3-hour H2H	1.12	0.85	0.83	0.75	0.63	1.19	0.91	0.92	0.85	0.69	1.22	0.96	0.88	0.72	0.81	0.78	0.71	0.69	0.84	0.82	0.76	0.72	0.81	0.71	0.69
	24-hour H1H	0.42	0.31	0.33	0.33	0.32	0.41	0.33	0.34	0.36	0.35	0.41	0.34	0.37	0.37	0.28	0.28	0.31	0.32	0.28	0.28	0.31	0.32	0.24	0.27	0.29
	24-hour H2H	0.29	0.22	0.23	0.24	0.25	0.29	0.23	0.23	0.27	0.28	0.29	0.24	0.27	0.29	0.19	0.19	0.22	0.23	0.19	0.19	0.22	0.23	0.16	0.19	0.20
	Annual	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01

NTE Killingly Energy Center									
Combined Cycle Combustion Turbine - Start-up/Shutdown (SU/SD) Emissions Estimates									
Fuel		Natural Gas				ULSD			
Case #:		Hot Start	Warm Start	Cold Start	Shutdown	Hot Start	Warm Start	Cold Start	Shutdown
xhaust velocity (m/s)		14.128	14.840	12.174	10.315	10.150	11.014	9.989	9.946
aust temperature (K)		352.444	353.556	351.889	353.000	403.556	404.111	403.556	401.333
NOx (g/s)		15.649	17.871	14.091	10.065	22.130	24.304	21.784	21.226
CO (g/s)		47.546	54.952	59.992	26.497	249.007	290.502	277.902	54.100
PM (g/s)		2.277	2.200	2.027	2.385	4.095	4.142	4.127	4.064
SO2 (g/s)		0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788	0.4788
AERMOD SU/SD Impacts - turbine only (ug/m3 per g/s) - 150 ft. turbine stack height									
Unit	1-hour H1H	4.404	4.280	4.984	5.587	4.288	4.045	4.333	4.374
	1-hour H2H	4.358	4.197	4.920	5.575	4.155	3.879	4.207	4.260
	3-hour H1H	2.238	2.217	2.377	2.690	2.214	2.167	2.226	2.253
	3-hour H2H	2.126	2.040	2.353	2.588	2.031	1.927	2.049	2.069
	8-hour H1H	1.569	1.460	1.890	2.223	1.774	1.613	1.803	1.829
	8-hour H2H	1.388	1.296	1.654	1.999	1.459	1.329	1.484	1.509
	24-hour H1H	0.925	0.854	1.134	1.361	1.044	0.939	1.065	1.083
	24-hour H2H	0.692	0.629	0.873	1.083	0.736	0.645	0.753	0.770
	24-hour H6H	0.526	0.488	0.620	0.746	0.547	0.495	0.552	0.569
	Annual	0.052	0.048	0.064	0.079	0.049	0.043	0.050	0.051
AERMOD SU/SD Scaled Impacts - turbine only (ug/m3) - 150 ft. turbine stack									
NO2	1-hour H1H	53.29	58.61	53.09	42.48	70.73	72.95	70.40	69.43
	1-hour H8H	35.89	39.67	35.60	28.14	49.10	51.22	48.75	47.90
	Annual	0.82	0.86	0.91	0.79	1.08	1.05	1.09	1.08
CO	1-hour H1H	209.41	235.19	299.01	148.05	1067.76	1175.01	1204.06	236.66
	1-hour H2H	207.18	230.61	295.18	147.72	1034.70	1126.97	1169.08	230.47
	8-hour H1H	74.60	80.20	113.36	58.91	441.65	468.71	501.02	98.94
	8-hour H2H	66.01	71.20	99.23	52.97	363.33	386.11	412.34	81.62
PM10	24-hour H1H	2.11	1.88	2.30	3.25	4.27	3.89	4.40	4.40
	24-hour H2H	1.58	1.38	1.77	2.58	3.01	2.67	3.11	3.13
	24-hour H6H	1.20	1.07	1.26	1.78	2.24	2.05	2.28	2.31
	Annual	0.12	0.11	0.13	0.19	0.20	0.18	0.21	0.21
PM2.5	24-hour H1H	1.22	1.08	1.36	1.97	2.43	2.19	2.49	2.50
	24-hour H8H	0.55	0.49	0.61	0.89	0.99	0.90	1.02	1.03
	Annual	0.09	0.08	0.10	0.15	0.16	0.14	0.16	0.16
SO2	1-hour H1H	2.04	1.96	2.26	2.53	1.91	1.80	1.94	1.96
	1-hour H4H	1.71	1.63	1.91	2.14	1.62	1.51	1.64	1.67
	3-hour H1H	1.07	1.06	1.14	1.29	1.06	1.04	1.07	1.08
	3-hour H2H	1.02	0.98	1.13	1.24	0.97	0.92	0.98	0.99
	24-hour H1H	0.44	0.41	0.54	0.65	0.50	0.45	0.51	0.52
	24-hour H2H	0.33	0.30	0.42	0.52	0.35	0.31	0.36	0.37
	Annual	0.03	0.02	0.03	0.04	0.02	0.02	0.02	0.02

NTE Killingly Energy Center - Detailed Results Table

Pollutant	Averaging Period	Rank for SIL	Maximum Impact (SIL) (µg/m³)	Maximum Impact Receptor Location		Elevation (m)	Maximum Impact Date (YRMODDHR)	Worst Case Turbine Load Scenario	SIL (µg/m³)	NAAQS (µg/m³)	PSD (µg/m³)
				UTM-E (m)	UTM-N (m)						
NO2 (SS)	1-hour	H1H	21.07	263450.00	4637250.00	206.19	5-year average	Case 68	**7.5**	**188**	**NA**
	Annual	H1H	0.93	257831.20	4638543.30	98.00	2011	Case 71	**1**	**100**	**25**
NO2 (SU/SD)	1-hour	H1H	84.31	263450.00	4637300.00	204.37	5-year average	Oil Warm Start	**7.5**	**188**	**NA**
	Annual	H1H	0.93	257831.20	4638543.30	98.00	2011	Case 71, Oil Cold Start	**1**	**100**	**25**
CO	1-hour	H1H	1427	263450.00	4637200.00	207.60	10050424	Oil Cold Start	**2000**	**40,000**	**NA**
	8-hour	H1H	131	258050.00	4638300.00	113.64	14110216	Case 32, Oil Cold Start	**500**	**10,000**	**NA**
PM10	24-hour	H1H	3.96	258100.00	4638300.00	113.64	10122724	Case 44, Oil Shutdown	**5**	**150**	**30**
	Annual	H1H	0.35	258170.90	4638568.90	97.05	2013	Case 44, Oil Shutdown	**1**	**NA**	**17**
PM2.5	24-hour	H1H (5YA)	3.15	258188.30	4638567.40	95.87	5-year average	Case 44, Oil Shutdown	**1.2**	**35**	**9**
	Annual	H1H (5YA)	0.29	258170.90	4638568.90	97.05	5-year average	Case 44, Oil Shutdown	**0.3**	**12**	**4**
SO2	1-hour	H1H	2.92	263450.00	4637200.00	207.60	5-year average	Case 32, Gas Shutdown	**7.9**	**196**	**NA**
	3-hour	H1H	1.51	258205.70	4638565.90	94.42	11012121	Case 32, Gas Shutdown	**25**	**1300**	**512**
	24-hour	H1H	0.99	258188.30	4638567.40	95.87	11032824	Case 32, Gas Shutdown	**5**	**365**	**91**
	Annual	H1H	0.09	258170.90	4638568.90	97.05	2013	Case 32, Gas Shutdown	**1**	**80**	**20**