Appendix A: Application for Administrative Modification to Air Permit-to-Install P011080

Oregon Clean Energy Center

Oregon Clean Energy, LLC
Natural Gas Energy for Ohio's Future

Application for Administrative Modification to Permit-to-Install P011080 – Revision 2

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
°F	degrees Fahrenheit
$\mu g/m^3$	microgram/cubic meter
BACT	Best Available Control Technology
BAT	Best Available Technology
BPIP	Building Profile Input Program
Btu/kW-hr	plant net heat rate per kilowatt-hour
CAA	Clean Air Act
CEM	continuous emission monitoring
CO	carbon monoxide
CO_{2e}	carbon dioxide equivalent
CTG	combustion turbine generator
EPC	Engineering, Procurement, and Construction
the Facility	Oregon Clean Energy Center
FLAG	Federal Land Managers Air Quality Related Values Workgroup
$g/m^2/yr$	gram per square meter per year
g/s	grams per second
GHG	greenhouse gas
GWP	global warming potential
H1H	highest first highest
H_2SO_4	sulfuric acid
HRSG	heat recovery system generator
HHV	higher heating value
K	Kelvin
km	kilometer
LADCO	Lake Michigan Air Directors Consortium
lb/hr	pound per hour
lb/MMBtu	pounds per million British thermal unit
lb/MW-hr	pounds per megawatt hour
m	meter
m/s	meters per second
m^3/s	cubic meters per second
msl	mean sea level
MAGLC	Maximum Acceptable Ground-Level Concentration

NAAQS	National Ambient Air Quality Standards
NO2	nitrogen dioxide
NO_x	nitrogen oxides
O_2	oxygen
OAC	Ohio Administrative Code
OCE	Oregon Clean Energy, LLC
Ohio EPA	Ohio Environmental Protection Agency
$PM_{2.5}$/PM_{10}	particulate matter
ppb	parts per billion
ppm	parts per million
ppmvd	parts per million volume, dry basis
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
PTI	Permit to Install
Q/D	quantity over distance
SCR	selective catalytic reduction
SIL	Significant Impact Level
SIP	State Implementation Plan
SO_2	sulfur dioxide
SMC	Significant Monitoring Concentrations
STG	steam turbine generator
tpd	tons per day
tpy	tons per year
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

1.0 INTRODUCTION

This submittal has been prepared to modify Permit to Install (PTI) No. P0110840 issued on June 18, 2013 for the Oregon Clean Energy Center (Facility ID 0448020102) (the Facility). The PTI authorizes Oregon Clean Energy, LLC (OCE) to install either a Mitsubishi Model M501GAC or Siemens Model SCC6-8000H combined-cycle combustion turbine. Since issuance of the permit, OCE has elected to install the Siemens Model SCC6-8000H combined-cycle combustion turbine.

Final guaranteed emissions from Siemens incorporated some revisions in the performance data from those used in the original PTI application, and the Engineering, Procurement, and Construction (EPC) contractor selected to construct the Facility has made adjustments to the layout and major structure heights. Furthermore, additional market analyses conducted for the Facility resulted in a revision to the projected operating scenario for the plant to allow for additional generating capacity and to allow for overlapping starts for the two turbines. Changes in regulation, policy or guidance made by the Ohio Environmental Protection Agency (Ohio EPA) and the United States Environmental Protection Agency (USEPA) since issuance of the PTI have also been considered. In addition to the above Facility refinements, OCE is proposing to revise the compliance language regarding start-up and shutdown operation in order to avoid confusion when the Facility becomes operational. As a result of these revisions, the estimated potential emissions for the Facility have changed. Although the estimated potential emissions have changed, the Facility will continue to meet Best Available Control Technology (BACT) and Best Available Technology (BAT), and impacts from the Facility will continue to comply with National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments.

This administrative permit modification application includes the following information:

- Section 2: Description of the proposed changes;
- Section 3: Pollution control technology review (BACT and BAT);
- Section 4: Proposed revised emission limits;
- Section 5: Proposed revised start-up and shutdown permit conditions;
- Section 6: Revised dispersion modeling results;
- Attachment A: Revised Siemens performance data;
- Attachment B: Revised Potential to Emit (PTE) calculations;
- Attachment C: Revised permit application forms; and
- Attachment D: Supporting data for revised modeling analysis. Modeling files will be provided to Ohio EPA electronically under separate cover.

2.0 DESCRIPTION OF PROPOSED CHANGES

As noted in the introduction, engineering refinements are proposed for the Facility in a number of areas. In order to confirm that, in aggregate, the changes are not significant and to update the PTI to reflect the current Facility refinements, this application addresses the modified Facility. The following sections detail the specific changes reflected in this application.

2.1 REGULATORY UPDATES

On November 29, 2013 the USEPA published in the Federal Register changes to the global warming potentials (GWPs) for methane and nitrous oxide. The GWP for methane was revised from 21 to 25 and for nitrous oxide from 310 to 298. Methane and nitrous oxide are emitted from the Facility's combustion sources and are a component of the Facility's greenhouse gas (GHG) emissions as carbon dioxide equivalents (CO_{2e}). Therefore, these changes in the GWPs for methane and nitrous oxide have a minor impact on estimated GHG emissions (as CO_{2e}).

No other changes in either Ohio EPA or USEPA regulation, rule or policy are known to exist that should be considered for this application.

The adjusted GWPs are utilized in updating the Facility's PTE.

2.2 EMISSION AND OPERATING SCENARIO UPDATES

The most recent Siemens performance data, provided in Attachment A, reflects guaranteed emissions and contains changes in various performance parameters and an increase in rated heat input for most operating conditions. This increase in heat input results in an increase in vendor-specified hourly mass emission levels, although at emission rates considered to reflect BACT/BAT.

At the time the original permit application was submitted, OCE anticipated that supplemental firing of the heat recovery steam generators (duct firing) would only occur during periods of warmer weather. Now, however, it is anticipated that the Facility could operate with duct firing during periods of cold weather when there is an increase in energy demand. Since the maximum heat input to the combustion turbines occurs during colder ambient temperatures, duct firing during these colder temperatures will result in a maximum heat input that is not accounted for in the PTI's permitted hourly mass emission rates. This adjustment will allow the Facility increased energy output beyond the 800 megawatts originally contemplated while using the same equipment.

At the time the original permit application was submitted, OCE anticipated that when the Facility was started, one combustion turbine would be started and would reach full operating load prior to starting the second combustion turbine. OCE is now requesting the operating flexibility to start both combustion turbines simultaneously in order to reach full plant operating load as quickly as possible.

At the time the original permit application was submitted, OCE anticipated that operation of the Facility would require predominantly warm starts based upon the projected duration between starts. OCE is currently projecting that the duration between starts will be shorter, and as a result, starts will predominantly be hot starts. Due to the shorter projected duration in downtime between starts, there is a net increase in estimated annual emissions when assuming a hot start as compared to a warm start. Because actual operating requirements are unknown, adjusting the annual emissions to reflect this flexibility is desired.

This application proposes updates in the Facility's PTE to reflect adjusted emissions, duct firing at lower temperatures, and a larger number of hot starts. In addition, this application includes dispersion modeling reflecting the adjusted emissions information as well as the desired overlap of turbine starts to confirm continued compliance with the NAAQS and PSD increments.

2.3 LAYOUT UPDATES

As EPC contractor selection has occurred, refinements to the layout and structure have resulted through more detailed consultation with Siemens and optimization of equipment on the site. No change has resulted to the stack location or height, or to the location of major influencing structures. However, slight building height adjustments have occurred, and the cooling tower has been reconfigured and relocated on the site.

This application includes dispersion modeling reflecting the changes in layout and structure characteristics to confirm continued compliance with the NAAQS and PSD increments.

3.0 POLLUTION CONTROL TECHNOLOGY REVIEW

The Facility is subject to BACT requirements in accordance with Ohio Administrative Code (OAC) Rule 3745-31-15 for emissions of nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), particulate matter ($PM_{2.5}$/PM_{10}), sulfuric acid (H_2SO_4), and GHGs. It is also subject to BAT requirements in accordance with OAC Rule 3745-31-05 for emissions of sulfur dioxide (SO_2). As defined under OAC Rule 3745-31-01, BACT is an "emission limitation" and BAT is "any combination of work practices, raw material specifications, throughput limitations, source design characteristics, an evaluation of the annualized cost per ton of air pollutant removed, and air pollution control devices that have been previously demonstrated to the director of environmental protection to operate satisfactorily in this state or other states with similar air quality on substantially similar air pollution sources."

BACT and BAT for the Facility were determined to be the firing of natural gas with a sulfur content no greater than 0.5 grains per 100 standard cubic feet and the installation of dry low NO_x combustors, selective catalytic reduction (SCR), and an oxidation catalyst. The proposed changes to the Facility will not affect the approved BACT and BAT emission limits with the exception of $PM_{2.5}$/PM_{10} and SO_2 emissions.

The current Siemens $PM_{2.5}$/PM_{10} performance emissions data is in compliance with the permit limits at full operating load but has a marginal increase in $PM_{2.5}$/PM_{10} emissions at reduced operating load without duct firing. The current Siemens performance emissions data shows a maximum $PM_{2.5}$/PM_{10} emission rate of 0.0054 pounds per million British thermal unit (lb/MMBtu) at 60 percent operating load at 105 degrees Fahrenheit (°F) (see Attachment A). BACT/BAT for $PM_{2.5}$/PM_{10} emissions from a combustion turbine is based upon firing the cleanest fuel, good combustion practices and vendor specified emission rates. The proposed change in the allowable $PM_{2.5}$/PM_{10} emission rate in units of lb/MMBtu does not affect this BACT and BAT determination. Therefore, it was determined that further review of BACT and BAT was not required for the proposed modification to the PTI.

The SO_2 emission rate is proposed to be increased from 0.0014 to 0.0015 lb/MMBtu. No change to the natural gas sulfur content of 0.5 grains per 100 standard cubic feet is proposed; however, the SO_2 emission rate is proposed to be revised to reflect the potential for somewhat lower heat content natural gas reflected in the vendor emissions guarantee.

Table 1 summarizes the approved and proposed BACT and BAT emission rates.

Table 1. Summary of Facility BACT/BAT Emission Rates

Pollutant	Current Permit		Proposed	
	Without Duct Firing	With Duct Firing	Without Duct Firing	With Duct Firing
NO_x	2.0 ppmvd at 15% oxygen (O_2)	2.0 ppmvd at 15% O_2	2.0 ppmvd at 15% O_2	2.0 ppmvd at 15% O_2
CO	2.0 ppmvd at 15% O_2	2.0 ppmvd at 15% O_2	2.0 ppmvd at 15% O_2	2.0 ppmvd at 15% O_2
VOC	1.0 ppmvd at 15% O_2	1.9 ppmvd at 15% O_2	1.0 ppmvd at 15% O_2	1.9 ppmvd at 15% O_2
$PM_{2.5}/PM_{10}$	0.0047 lb/MMBtu	0.0055 lb/MMBtu	0.0054 lb/MMBtu	0.0055 lb/MMBtu
H_2SO_4	0.0006 lb/MMBtu	0.0007 lb/MMBtu	0.0006 lb/MMBtu	0.0007 lb/MMBtu
GHGs	833 lb/MW-hr (gross), 7,227 Btu/kW-hr HHV (net)		833 lb/MW-hr (gross), 7,227 Btu/kW-hr HHV (net)	
SO_2	0.0014 lb/MMBtu	0.0014 lb/MMBtu	0.0015 lb/MMBtu	0.0015 lb/MMBtu

ppmvd at 15% O_2 = parts per million volume, dry basis, at 15% oxygen

lb/MMBtu = pounds emitted per million BTUs of fuel fired

lb/MW-hr (gross) = pounds emitted per gross megawatts per hour generated

Btu/kW-hr HHV = plant net heat rate in British thermal units (higher heating value) per kilowatt-hour

4.0 PROPOSED REVISED EMISSION LIMITS

The proposed Facility changes will increase pollutant mass emission rates on both a pound per hour (lb/hr) and annual, tons per year (tpy) basis. The increase in proposed hourly emission rates is relatively minor, reflecting the vendor-specified increase in heat throughput for all operating cases and duct firing at cold ambient temperatures. The increase in annual emissions reflects both the increase in maximum hourly emission rates and the net impact of hot starts versus warm starts. Table 2 provides a comparison of the emission limits in the PTI and the proposed emission limits as a result of the proposed Facility changes; the comparison is on a per turbine basis.

Table 2. Emission Limit Comparison

Pollutant	PTI			Proposed		
	lb/hr	lb/hr	tpy	lb/hr[a]	lb/hr[b]	Tpy[c]
NO_x	22.0	21.0	92.0	22.0	23.6	92.0
CO	13.0	13.0	72.2	13.0	14.4	91.3
VOC	3.9	5.9	28.6	3.9	5.9	38.5
$PM_{2.5}/PM_{10}$	13.3	14.0	61.3	13.3	15.1	61.3
SO_2	N/A	N/A	18.4	N/A	N/A	18.8
H_2SO_4	1.6	1.5	6.57	1.6	1.5	6.6
GHG	327,819		1,435,847	371,029		1,477,071

[a]Maximum lb/hr emissions, combustion turbine only (no duct firing)

[b]Maximum lb/hr emissions, combustion turbine with duct firing

[c]Based upon Siemens Case #31 (59°F, 100% load with duct firing) for 8,760 hours per year

All proposed lb/hr emission limits are based upon the maximum hourly emission rate for each pollutant, with and without duct firing, as provided by Siemens in its most recent performance data (provided in Appendix A). The permitted GHG lb/hr emission rate limit was based upon an annual average GHG emission rate. The proposed GHG lb/hr emission rate limit reflects the maximum hourly emission rate consistent with all other pollutants. All proposed tpy emission limits are based upon Siemens Case #31, which represents an expected annual average temperature of 59°F with the combustion turbine operating at full load with duct firing. The tpy emission limits for CO and VOC include the net increase in emissions resulting from start-up and shutdown operation as compared to steady state operation. A net increase in emissions will not occur from start-up and shutdown operation for the other pollutants.

Provided in Attachment B to this submittal are detailed emission calculations reflecting the above proposed emission levels.

5.0 START-UP AND SHUTDOWN PERMIT CONDITIONS

The PTI defines start-up and shutdown operation, with associated emission limits, in Condition 5(b)(2)m. The PTI establishes lb/hr emission rate limits for NO_x, CO, and VOC for each start type (cold, warm, and hot) and shutdown. The table that provides the lb/hr limits includes a stipulation that the "pound per hour emissions rates as presented are averaged over the duration of the event where the duration of a cold start is 180 minutes, the duration of a warm start is 98 minutes, the duration of a hot start is 82 minutes, and the duration of a shutdown is less than 1 hour." This is the approach the original permit application took to defining the start-up and shutdown emissions, which can vary significantly based on a number of factors. Anticipated average hourly values over the duration of the start-up were calculated on this basis for use in the Facility's dispersion modeling.

However, in the definitions for cold, warm, and hot start-up following the table, the PTI stipulates that a start-up period ends when "ten consecutive CEM [continuous emission monitoring] data points in compliance with the ppmvd emissions limitations for CO and NO_x." Should these compliance points be achieved in a shorter timeframe than that identified in the definition for each event, this creates an inconsistency between the two elements of this requirement and potential ambiguity in confirming compliance.

For example, the Siemens performance data provides an estimate of 188 pounds of NO_x emitted for a cold start that shall be no longer than 180 minutes. In the original application, this was converted to an average emission rate of 62.67 lb/hr over the course of the 180 minutes and established as a limit in the PTI. The emissions of NO_x are at their highest at the very beginning of the start when the SCR temperature is below its minimum operating point. When the SCR reaches its minimum operating temperature, ammonia injection will be initiated to control NO_x emissions to its BACT limits as quickly as possible. The great majority of the start-up NO_x emissions will occur from the point of initial fuel firing until ammonia injection is begun. It is likely that some cold starts will reach 2.0 ppmvd at 15% O_2 in less time than 180 minutes, but the amount of NO_x emitted during the start will still be at or near 188 pounds. In these cases, the average hourly NO_x emission rate will exceed 62.67 lbs/hr, as measured by the CEM system, if the emissions are averaged over the shorter time period of when the emissions have achieved compliance with steady state limits as opposed to the maximum allowed duration of the start.

In order to clarify compliance once the plant is operational, OCE requests that the start-up and shutdown limits listed in Condition 5(b)(2)m be changed from an average lbs/hr limit (start-up emissions averaged over the duration of a start to yield a lbs/hr value) to a maximum lbs/hr limit, not to be exceeded in any hour during a start. As no change is requested in the duration or pounds emitted per event, this does not reflect an increase in start-up or shutdown emissions. Following are proposed start-up and shutdown permit conditions. The revised modeling provided with this document has utilized the worst-case maximum one-hour NO_x emission rates for each start type to ensure that predicted impacts are in compliance with the NAAQS.

The permittee shall comply with the following requirements during periods of start-up and shutdown.

Pollutant	*Cold Start-up (lbs/hr)*	*Warm Start-up (lbs/hr)*	*Hot Start-up (lbs/hr)*	*Shutdown (lbs/hr)*
CO	*546*	*351*	*289*	*113*
NO_x	*188*	*129*	*105*	*46*
VOC	*168*	*138*	*114*	*45*

"Cold Start-up" is defined as a combustion turbine start-up that occurs more than 64 hours after a combustion turbine shutdown. The period of start-up is defined as the lesser of the first 180 minutes of continuous fuel flow to the combustion turbine after fuel flow is initiated or the period of time from combustion turbine fuel flow initiation until the combustion turbine achieves ten consecutive CEM data points in compliance with the ppmvd emissions limitations for CO and NO_x*.*

"Warm Start-up" is defined as a combustion turbine start-up that occurs between 16 hours of and 64 hours of a combustion turbine shutdown. The period of start-up is defined as the lesser of the first 98 minutes of continuous fuel flow to the combustion turbine after fuel flow is initiated or the period of time from combustion turbine fuel flow initiation until the combustion turbine achieves ten consecutive CEM data points in compliance with the ppmvd emissions limitations for CO and NO_x*.*

"Hot Start-up" is defined as a combustion turbine start-up that occurs within 16 hours of a combustion turbine shutdown. The period of hot start-up is defined as the lesser of the first 82 minutes of continuous fuel flow to the combustion turbine after fuel flow is initiated or the period of time from combustion turbine fuel flow initiation until the combustion turbine achieves ten consecutive CEM data points in compliance with the ppmvd emissions limitations for CO and NO_x*.*

6.0 REVISED DISPERSION MODELING RESULTS

An updated dispersion modeling analysis was conducted for the Facility to evaluate potential air quality impacts resulting from the proposed modifications. This analysis was conducted in accordance with the methodology described in February 2013 Dispersion Modeling Report (Volume 2 – Siemens SCC6-8000H Turbine Scenario) which was submitted to Ohio EPA, including the use of the AERMOD dispersion model. Updates to the analysis include the following:

- Used the updated version of AERMOD (version 14134);
- Used an updated set of meteorological data (2008-2012). The data is based on the same meteorological monitoring station (Toledo, Ohio surface data/Detroit, Michigan upper air data) as was used in the original analysis and is recommended by Ohio EPA for Lucas County. Ohio EPA prepared these data using AERMET (version 12345) and provided the data on its website;
- Revised the Building Profile Input Program (BPIP) analysis for the updated Facility site layout configuration (see Attachment D); and
- Evaluated an updated set of operating scenarios/source parameters consistent with the revised Facility design and increased generating capacity.

The updated model results indicate that all steady-state operating cases with adjusted layout and emissions continue to result in impacts below the PSD Significant Impact Levels (SILs). Model results for start-up conditions indicate that impacts under that operating condition will exceed the 1-hour nitrogen dioxide (NO_2) SIL. However, with the addition of ambient background concentrations, total concentrations are well below the NAAQS during all start-up conditions.

A summary of the revised dispersion modeling analysis is provided below.

6.1 MODELING INPUTS

The emission rates and stack parameters used in the modeling analyses are provided in the following tables: combined cycle turbine units (Table 3), turbine start-up conditions (Table 4), and ancillary equipment (Table 5).

6.1.1 Revised BPIP Analysis

The revised Project layout and building elevations were evaluated with the “PRIME” version of the BPIP. The revised site layout and additional building details are shown on the schematic diagrams provided in Attachment D. Table 6 summarizes the major facility building structures and distance to stack information used for the BPIP analysis. The heat recovery system generator (HRSG) platform structures are the controlling building structures for the main turbine stacks.

6.1.2 Receptors

The receptor grid is based on the same spacing as was used for the original modeling, and is summarized as follows:

- Receptors placed along the facility fence line at 25 meter (m) intervals.
- A nested Cartesian grid based on a 5 kilometer (km) by 5 km inner grid at 100 m intervals, with 25 km x 25 km outer grid at 1,000 m intervals.

The AERMAP terrain processor along with National Elevation Dataset data were used to determine terrain elevations.

Table 3. Facility Stack Parameters and Emission Rates for Each Combustion Turbine

Parameter	Units	Selected Design Cases												
		Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7
Ambient Temperature	°F	-8	-8	-8	-8	59	59	59	59	105	105	105	105	105
Percent Load Rate	%	100	100	75	60	100	100	75	60	100	100	100	75	60
Evaporative Cooler	--	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
Duct Burner Operation	--	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
Stack Diameter	feet	22	22	22	22	22	22	22	22	22	22	22	22	22
Stack Height	feet	240	240	240	240	240	240	240	240	240	240	240	240	240
Stack Temperature	K	353.7	353.7	350.4	349.3	353.2	357.6	350.9	349.8	352.0	357.6	352.0	354.8	353.7
Stack Flow Rate	m^3/s	668.8	664.7	513.6	450.4	613.6	617.0	480.2	424.3	552.5	556.5	517.6	439.7	391.7
Stack Exit Velocity	m/s	18.93	18.81	14.54	12.75	17.36	17.46	13.59	12.01	15.64	15.75	14.65	12.44	11.09
NO_x	g/s	2.97	2.76	2.18	1.86	2.65	2.46	1.92	1.64	2.49	2.18	2.00	1.63	1.40
CO	g/s	1.81	1.64	1.32	1.13	1.64	1.50	1.17	1.01	1.52	1.34	1.22	1.00	0.86
$PM_{10}/PM_{2.5}$	g/s	1.90	1.68	1.29	1.01	1.76	1.50	1.18	1.06	1.73	1.31	1.25	1.07	1.01

K = Kelvin
m/s = meters per second
m^3/s = cubic meters per second
g/s = grams per second

Table 4. Facility Modeling Inputs for Combustion Turbine Generator (CTG) Start-up Events

Pollutant	Units	Cold Start-up	Warm Start-up	Hot Start-up	Shutdown
Stack Diameter	feet	22	22	22	22
Stack Height	feet	240	240	240	240
Exit Temperature	K	349.5	348.5	348.1	351.5
Exit Velocity	m/s	11.29	12.40	13.00	15.45
NO_x	g/s	23.69	16.25	13.23	7.32
CO	g/s	68.80	44.23	36.41	15.17

Note: Emission rates based on maximum hourly emissions during start-up plus full load steady-state emissions for the balance of the hour.

Table 5. Facility Stack Parameters and Emission Rates for Ancillary Equipment

	Units	Auxiliary Boiler [a]	Cooling Tower [b]
Fuel Type	--	Natural Gas	--
Stack Diameter	feet	4	33
Stack Height	feet	240	46
Stack Temperature	K	366.48	Ambient + 10 K
Stack Exit Velocity	m/s	0.17	8.45
NO_x	g/s	0.25	--
CO	g/s	0.69	--
PM_{10}	g/s	0.10	0.0119
$PM_{2.5}$	g/s	0.10	0.0000466

a. The auxiliary boiler will exhaust through a separate stack adjacent to the north HRSG stack. For modeling, the south HRSG stack and the auxiliary boiler stack were modeled as separate stacks while the north turbine stack and the auxiliary boiler stack are modeled as combined stacks. The emission rates and stack temperature in this table are representative of the auxiliary boiler operating alone.

b. The cooling tower emission rates are on a per cell basis. There will be 11 cells in the cooling tower.

Table 6. Facility Major Building Structures

Building	Height (feet)	Length (feet)	Width (feet)	Base Elevation (feet msl)	Distance to Stack		
					HRSGN[a] Stack (feet)	HRSGS[b] Stack (feet)	Cooling Tower (feet)
STG Building	99.75	201	121	590	246	146	333
HRSG-N Platform	99	91.5	60.6	590	21	121	597
HRSG-S Platform	99	91.5	60.6	590	121	21	553
Cooling tower	36	612	107.5	590	178	190	0
CTG Building High Bay	84.1	302	53.6	590	190	190	370
CTG Building Low Bay	52.5	302	82.4	590	243	243	290

STG = Steam Turbine Generator; HRSG-N = Northern HRSG; HRSG-S = Southern HRSG; msl = mean sea level

6.1.3 Meteorological Data

An updated preprocessed AERMOD-ready 5 year meteorological data set obtained from the Ohio EPA was used for the meteorological inputs. The data set is based on hourly surface data from the National Weather Service station at Toledo Express Airport, along with upper air observations from Detroit, Michigan for the calendar years 2008 through 2012.

6.1.4 Ambient Background Data

The ambient background air quality is based on the same Ohio EPA monitoring site data as was used for the original modeling study. This data is presented in Table 7 and is considered representative of ambient background air quality for the Project site area. Note that more recent (2012) Ohio EPA monitoring data indicates ambient concentrations levels have decreased for CO, $PM_{2.5}$, and PM_{10}. The monitor used for NO_2 ambient background (Athens) did not report data for 2012.

Table 7. Background Air Quality Monitoring Stations and Air Quality Data

Pollutant	Averaging Period	Background Concentration (µg/m^3)	NAAQS (µg/m^3)	Station Location	Station ID
PM_{10}	24-hour	86	150	Lee and Front, Toledo, Lucas County	39-095-1003
$PM_{2.5}$	24-hour	29	35	600 Collins Park, Toledo, Lucas County	39-095-0028
	Annual	11.42	12		
NO_2	Annual	5.9	99.7	7760 Blackburn Road, Athens, Athens County	39-009-0004
	1-hour	37.79	188		
CO	1-hour	1,484	40,000	901 W. Fairview, Dayton, Montgomery County	39-113-0028
	8-hour	1,142	10,000		

µg/m^3 = micrograms per cubic meter

6.2 MODELING RESULTS

Modeling was conducted for the range of steady state operating conditions described in Table 3. The start-up conditions described in Table 4 were also considered in combination with the auxiliary boiler to determine worst-case impact concentrations. Maximum AERMOD predicted impact concentrations are presented in Table 8 along with a comparison to SILs, Significant Monitoring Concentrations (SMCs), and PSD Increments. Impact concentrations are less than the corresponding SIL, SMC, and PSD increment thresholds for all pollutants, except for the 1-hour NO_2 SIL for transient start-up conditions. Consistent with Ohio EPA guidance, maximum impacts are summed with ambient background for the NAAQS compliance assessment, as presented in Table 9. This table shows that the sum of all modeled maximum impacts and existing ambient background levels are less than the NAAQS. For 1-hour NO_2, for which maximum Project impacts exceed the SIL, the sum of maximum impact plus background is less than 42 percent of the NAAQS, which ensures compliance with a large margin for potential impacts from other emission sources. Detailed modeling results are presented in Attachment D, with modeling filings provided electronically to Ohio EPA under separate cover.

Table 8. Facility Maximum Predicted Impacts

	Averaging time	Predicted impact (µg/m^3)	Controlling Scenario	Year	SIL (µg/m^3)	SMC (µg/m^3)	PSD Increments
NO_2	Annual	0.08	Case 5: 100% Load, 105°F, DB on	2012	1.0	14	25
	1-hour	41.4	Two Turbine Cold Start + Aux. Boiler	5-year average	7.52	Not yet proposed	--
CO	1-hour	207.9	Two Turbine Cold Start + Aux. Boiler	2010	2,000	--	--
	8-hour	100.0	Two Turbine Cold Start + Aux. Boiler	2010	500	575	--
$PM_{2.5}$ (NAAQS)	24-hour	0.66	Case 5 + Cooling Tower: 100%, 105°F, DB on	5-year average	1.2	4	9
	Annual	0.05	Case 5 + Cooling Tower: 100%, 105°F, DB on	5-year average	0.3	--	4
$PM_{2.5}$ (PSD)	24-hour	0.99	Case 5 + Cooling Tower: 100%, 105°F, DB on	2008	1.2	4	9
	Annual	0.05	Case 5 + Cooling Tower: 100%, 105°F, DB on	2009	0.3	--	4
PM_{10}	24-hour	3.6	Case 5 + Cooling Tower: 100%, 105°F, DB on	2012	5	10	30

Note: $PM_{2.5}$ rank compliance basis for NAAQS SIL comparison based on maximum highest first highest (H1H) 5-year average concentration. $PM_{2.5}$ rank compliance basis for PSD increment SIL comparison based on maximum H1H concentrations over the range of 5 years modeled.

DB = Duct Burner; Aux. Boiler = Auxiliary Boiler

Table 9. Maximum Facility Predicted Impacts Added to Monitored Background Concentrations

	Averaging Time	Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Predicted Impact plus Background ($\mu g/m^3$)	NAAQS
NO_2	Annual	0.07	5.9	6.0	99.7
	1-hour	41.4	37.79	79.2	188
CO	1-hour	207.9	1,484	1,691.9	40,000
	8-hour	100.0	1,142	1,242.0	10,000
$PM_{2.5}$	24-hour	0.66	29	29.6	35
	Annual	0.05	11.42	11.47	12
PM_{10}	24-hour	3.6	86	89.6	150
Note: Predicted Impacts are conservatively based on the maximum H1H concentrations and do not take credit for the lower ranked concentrations that can be used for NAAQS compliance assessments.					

6.2.1 Additional Impacts Analyses

The additional impact analyses required for PSD projects have been updated to evaluate the revised project design. The Federal Land Managers AQRV Workgroup guidance (Phase I Report – Revised, 2010) screening criteria (quantity over distance [Q/D]) method was updated for the increased Project emissions and closest Class I areas. The updated Q/D analysis results are presented in Table 10 and demonstrate that Q/D is well below 10. Therefore, further Class I impact analyses are not required.

Table 10. Facility "Q/D" Screening Analysis for PSD Class I Areas

Class I Area	d, Distance to Class I Area (km)	Potential Emissions (lb/hr/unit)				Q, Total Emissions (tpy)	Q/D (tpy/km)
		SO_2	NO_x	PM_{10}	H_2SO_4		
Otter Creek	439	4.7	23.6	13.5	1.6	380.2	0.87
Dolly Sods	457	4.7	23.6	13.5	1.6	380.2	0.83
Mammoth Cave	548	4.7	23.6	13.5	1.6	380.2	0.69

The PSD-required soil and vegetation impact analysis was also updated for the updated Project design. This analysis is consistent with USEPA guidance and with what was presented previously for the Project. Maximum predicted Project impacts are compared to the relevant screening levels in Tables 11 through 14. As shown in these tables, maximum predicted Project impacts are all well below these vegetative impact thresholds.

Table 11. Predicted Facility Air Quality Impacts Compared to NO_2 Vegetation Impact Thresholds

Averaging Period	Predicted Project Impact (μg/m³)	Threshold for Impact to Vegetation (μg/m³)	Applicability
1-hour	41.4 (1-hour average)	66,000[a]	Leaf Injury to plant
2-hour		1,130[b]	Affects alfalfa
Annual	0.07	100[c]	Protects all vegetation
		190[d]	Metabolic and growth impact to plants

a. "Diagnosing Injury Caused by Air Pollution", EPA-68-02-1344, prepared by Applied Science Associates, Inc. under contract to the Air Pollution Training Institute, Research Triangle Park, North Carolina. 1976.

b. "Synergistic Inhibition of Apparent Photosynthesis Rate of Alfalfa by Combinations of SO_2 and NO_2" Environmental Science and Technology, vol. 8(6): p.574-576, 1975. The limit is based on a concentration in ambient air of 0.6 parts per million (ppm) NO_2 (1,130 μg/m³) which was found to depress the photosynthesis rate of alfalfa during a 2-hour exposure.

c. Secondary NAAQS (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 [CAA]). These thresholds are the most stringent of those found in the literature survey.

d. "Air Quality Criteria for Oxides of Nitrogen," EPA/600/8-91/049aF-cF.3v, Office of Health and Environment Assessment, Environmental Criteria and Assessment Office, USEPA, Research Triangle Park, NC. 1993.

Table 12. Predicted Facility Air Quality Impacts Compared to CO Vegetation Impact Thresholds

Averaging Period	Predicted Impact (μg/m³)	Threshold for Impact to Vegetation (μg/m³)	Applicability
1-hour	207.9	40,000[a]	Protects all vegetation
8-hour	100.0 (8-hour average)	10,000[a]	Protects all vegetation
Multiple day		10,000[b]	No known effects to vegetation
1-week		115,000[c]	Effects to some vegetation
Multiple week		115,000[d]	No effect on various plant species

a. Secondary NAAQS (μg/m³) which are limits 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 CAA). These thresholds are the most stringent found in the literature.

b. "Air Quality Criteria for Carbon Monoxide," EPA/600/8-90/045F (NTIS PB93-167492), Office of Health and Environment Assessment, Environmental Criteria and Assessment Office, USEPA, Research Triangle Park, NC. 1991. Various CO concentrations were examined; the lowest of these was 10,000 μg/m³. Concentrations this low had no effects to various plant species. For many plant species, concentrations as high as 230,000 μg/m³ caused no effects. The exception was legume seedlings which were found to experience abnormal leaf growth when exposed to CO concentrations of only 27,000 μg/m³. Also related to this family of plants, CO concentrations in the soil of 113,000 μg/m³ were found to inhibit nitrogen fixation. It is clear that ambient CO concentrations as low as 10,000 μg/m³ will not affect vegetation.

c. "Diagnosing Injury Caused by Air Pollution," EPA-68-02-1344, prepared by Applied Science Associates, Inc. under contract to the Air Pollution Training Institute, Research Triangle Park, North Carolina. 1976. A CO concentration of 115,000 μg/m³ was found to affect certain plant species.

d. "Polymorphic Regions in Plant Genomes Detected by an M13 Probe," Zimmerman, P.A., et al. 1989. Genome 32: 824-828. 115,000 μg/m³ was the lowest CO concentration included in this study. This concentration was not found to cause a reduction in growth rate to a variety of plant species.

Table 13. Predicted Facility Air Quality Impacts Compared to Particulate Vegetation Impact Thresholds

Averaging Period	Predicted Impact (μg/m^3)	Threshold for Impact to Vegetation (μg/m^3)	Applicability
24-hour PM_{10}	3.6 (24-hour average)	150[a]	Protects all vegetation
Annual PM_{10}	0.5	50[a]	Protects all vegetation
Annual PM_{10}	0.5	579[b]	Damage to sensitive species (fir tree)

a. Secondary NAAQS (μg/m^3) which are limits 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 CAA). These thresholds are the most stringent of those found in the literature survey.

b. "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 grams per square meter per year (g/m^2/yr) caused damage to fir trees, but rates of 274 g/m^2/yr and 400 to 600 g/m^2/yr did not cause damage to vegetation. 365 g/m^2/yr translates to 579 μg/m^3, using a worst-case deposition velocity of 2 centimeters per second.

Table 14. Predicted Facility Air Quality Impacts Compared to Formaldehyde Vegetation Impact Thresholds

Averaging Period	Predicted Impact (μg/m^3)	Threshold for Impact to Vegetation (μg/m^3)	Applicability
Repeated 4.5 hour	0.151 (1-hour average)	18[a]	Sensitive species affected
5-hour		840[b]	Signs of injury to sensitive species (alfalfa)
5-hour		367[c]	Signs of injury to pollen tube length (lily)
Repeated 7-hour		78[d]	Stimulated shoot growth (beans)

a. "Formaldehyde-Contaminated Fog Effects on Plant Growth," Barker J.R. & Shimabuku R.A. (1992). In Proceedings of the 85th Annual Meeting and Exhibition, Air and Waste Management Association, pp. 113. 92150.01. Pittsburgh, PA. The authors examined the effects on vegetation grown in fog with formaldehyde concentrations of 18 and 54 μg/m^3. Exposure rates were 4.5 hours per night, 3 nights/week, for 40 days. The growth rate of rapeseed was found to be affected in this study. However, slash pine grown under the same conditions showed a significant increase in needle and stem growth. No effects were observed in wheat or aspen at test concentrations.

b. "Investigation on Injury to Plants from Air Pollution in the Los Angeles Area." Haagen-Smit AJ, Darley EE, Zaitlin M, Hull H, Noble WM (1952). Plant physiology, 27:18–34. The authors found a 5-hour exposure to 700 parts per billion (ppb) caused mild atypical signs of injury in alfalfa, but no injury to spinach, beets, or oats.

c. "Effects of Exposure to Various Injurious Gases on Germination of Lily Pollen." Masaru N, Syozo F, Saburo K (1976). Environmental pollution, 11:181–188. The authors found a significant reduction of the pollen tube length of lily following a 5-hour exposure to ambient formaldehyde concentrations of 367 ppb.

d. "Formaldehyde exposure affects growth and metabolism of common bean," Mutters RG, Madore M, Bytnerowicz A (1993). Journal of the Air and Waste Management Association, 43:113–116. The authors found that repeated exposure of sensitive plants to ambient formaldehyde concentrations of 78 μg/m^3 could cause plant shoots to grow faster than the roots. It is pointed out that this effect would not be a problem except for crops growing in a water-starved condition.

6.2.2 Air Toxics

The air toxics impact analysis was updated for the new Facility design. The analysis is consistent with Ohio EPA's guidelines, as was described in detail in the February 2013 Dispersion Modeling Report. Updated air toxic impact concentrations considering the full range of normal operating load conditions are presented in Table 13 along with the corresponding Maximum Acceptable Ground-Level Concentration (MAGLC). The toxic impact concentrations are less than the corresponding MAGLC for each pollutant.

Table 15. Facility Air Toxics Modeling Results

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Controlling Scenario	MAGLC (µg/m^3)
H_2SO_4	1-hour	0.439	Case 12: 100%, -8°F, DB off	4.76
Ammonia	1-hour	5.964	Case 3: 100%, -8°F, DB on	404.8
Formaldehyde	1-hour	0.094	Case 3: 100%, -8°F, DB on	6.5
Toluene	1-hour	0.105	Case 12: 100%, -8°F, DB off	1,786
Xylenes	1-hour	0.052	Case 12: 100%, -8°F, DB off	10,333

6.2.3 Potential Contribution to Regional Ozone Levels

Chemical transformation of NO_X and VOC can contribute to the formation of ambient ozone in the atmosphere. The photochemical processes that lead to ozone formation occur over many hours, and are affected by precursor emissions over a large region, often 100 miles or more. The USEPA recommends the use of regional-scale photochemical models to estimate ozone impacts; such an extensive modeling analysis is not appropriate for an individual proposed emission source, since even a large facility will generally represent a very small contributor to regional emissions.

As was previously completed for the Project, the analysis presented below relies on regional-scale photochemical modeling performed by the Lake Michigan Air Directors Consortium (LADCO), which was formed to address regional-scale pollution issues for a five-state region (Michigan, Wisconsin, Illinois, Indiana, and Ohio). LADCO has undertaken regional photochemical modeling for the northern Midwest region during the last two decades to provide information for development of State Implementation Plans (SIPs) for ozone and for $PM_{2.5}$. Round 4 modeling was performed using the regional photochemical model CAMx. Impacts were evaluated for a number of emissions scenarios.

The potential impact of the proposed Project on peak ozone levels was assessed with a "hybrid" modeling approach. First, LADCO regional modeling results were used to determine the sensitivity of predicted peak 8-hour ozone concentrations to changes in regional emissions of "precursor" emissions of VOC and NO_x. This sensitivity was then applied to estimate the potential impact of the emissions increases associated with the Project on peak ozone levels.

6.2.3.1 Sensitivity Based on LADCO Round 4 Results

To assess the sensitivity of predicted ozone levels to emissions of NO_x and VOC, predicted impacts Ohio receptors were compared for three Round 4 scenarios (presented below), chosen because they provide the means to judge sensitivity separately for changes in NO_x and VOC emissions.

Table 16. NOx and VOC for 5-State Region

	NOx (tpd) for 5-State Region	VOC (tpd) for 5-State Region
Scenario 1A (2012 Base)	6,131	5,529
Scenario 2C (focused on NOx emission reductions)	5,433	5,492
Scenario 3A (focused on VOC emission reductions)	5,466	4,814
tpd = tons per day		

Regional emissions for Scenario 2C are 11.4% lower for NO_x, relative to the Base Case (Scenario 1A), while VOC emission for the two cases are almost the same. By contrast, emissions for Scenario 3A are 14.1% lower for VOC, compared to Scenario 2C, while NO_x emissions for 2C and 3A are very similar. Differences in predicted ozone levels for each pair of cases, therefore, reflects the sensitivity to changes in emissions on one precursor (NO_x and VOC).

The LADCO Round 4 modeling report provides predicted peak "design" levels for 8-hour average ozone for four monitoring sites in west central Ohio (outside of Cincinnati). The difference in predicted impact between Scenario 1A and 2C was between 0.9 and 2.1 parts per billion (ppb) at those sites. Using the highest predicted change, the sensitivity results indicate that an 11.4% decrease in regional NO_x emissions would result in a decrease of up to 2.1 ppb in peak 8-hour average ozone levels.

Similarly, the Scenario 3A results show that a decrease of 0.4 to 1.0 ppb in peak 8-hour average ozone levels would result from a reduction of 14.1% in regional VOC emissions.

6.2.3.2 Estimated Facility Impacts for Ozone

The change in regional emissions resulting from the addition of the Facility was estimated by comparing proposed Project emissions to the EPA 2011 National Emission Inventory (NEI) regional baseline. To estimate regional emissions, a 12-county region in northwest Ohio was chosen (Defiance, Fulton, Handcock, Henry, Lucas, Ottawa, Paulding, Putnam, Sandusky, Seneca, Williams, and Wood Counties). This region extends roughly 100 miles East-West by 60 miles North-South. The modeling grid used for ozone in CAMx has 12-km spacing so this region is roughly nine grid squares North-South by 15 grid squares East-West. The 2011 base case emissions for this region total 212.5 tpd of NO_x and 210.1 tpd of VOC.

By comparison, the Project's emissions are 0.53 tpd of NOx and 0.10 tpd of VOC. Proposed Project emissions represent 0.25% of regional NO_x emissions, and 0.10% of regional VOC emission. Using the sensitivity determined from LADCO modeling, the estimated Project impacts on peak 8-hour average ozone are 0.06 ppb (0.06 ppb from NO_x and 0.01 ppb from VOC emissions).

The existing 8-hour average background air quality concentration for ozone is 70.6 ppb, based on the "design" value (3-year average, 4^{th} highest daily maximum 8-hour concentration) at the nearest monitoring station (site 39-095-0024). This monitoring station is located in Toledo, about 8 km southwest of the Project site. The fourth-highest observed concentrations were 63 ppb, 66 ppb, and 83 ppb for 2010, 2011, and 2012, respectively. The estimated design concentration, including project impact, is 70.8 ppb (70.7 ppb plus 0.1 ppb), well below the 75 ppb NAAQS for 8-hour average ozone. This analysis demonstrates that the proposed Project would have a negligible effect on regional ozone levels.

6.2.4 Secondary $PM_{2.5}$ Assessment

The following analysis of $PM_{2.5}$ impacts is consistent with recent USEPA guidance on $PM_{2.5}$ permit modeling (*Guidance for $PM_{2.5}$ Permit Modeling*, Steven Page, USEPA, 5/20/14). Since the project has an annual potential to emit of both direct $PM_{2.5}$ and NO_X 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 the primary $PM_{2.5}$ emissions have been determined with dispersion modeling using AERMOD as described in the Air Permit Application for Administrtive Modification. The guidance indicates that the project falls in the Case 3 Assessment category, for which secondary $PM_{2.5}$ can be assessed by either a qualitative, hybrid qualitative/quantitative, or full quantitative approach.

Consistent with the guidance, both a qualitative and a hybrid qualitative/quantitative assessment have been used to assess potential secondary $PM_{2.5}$ impacts for the project.

6.2.4.1 Qualitative Analysis

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 (approximately 900 meters or less from the facility sources, depending on load case and averaging period). 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 the 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, for which project emissions are less than the significant emission rate threshold.

3. Predicted model results indicate that primary $PM_{2.5}$ impact predictions will be less than the $PM_{2.5}$ SILs. Representative ambient background levels for $PM_{2.5}$ indicate that there is substantial margin between the NAAQS and the background levels. Therefore, the SILs provide an adequate margin of safety for the NAAQS and any additional $PM_{2.5}$ from secondary formation will not jeopardize the NAAQS.

4. The ambient background $PM_{2.5}$ monitoring data is quality assured and accounts 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.

5. The RAPS monitor (EPA AIRS monitor 39-095-0026) located in Toledo could also be considered a representative monitor for $PM_{2.5}$ ambient background data, and this monitor has $PM_{2.5}$ speciation data available. This speciation data was reviewed relative to the question of secondary $PM_{2.5}$ formation in the area.

   Over a three-year period (2011-2013), on average, total nitrate makes up approximately 35.1 percent of the total 24-hr concentration and 17.8 percent of the total annual concentration. During the same three-year period, on average, sulfate makes up approximately 28.4 percent of the total 24-hour concentration and 22.8 percent of the total annual concentration. On average, over the last three years of monitoring date, the maximum 24-hour and annual nitrate concentrations are 7.8 $\mu g/m^3$ and 1.8 $\mu g/m^3$, respectively. On average, over the last three years of monitoring date, the maximum 24-hour and annual sulfate concentrations are 6.3 $\mu g/m^3$ and

2.3 μg/m^3, respectively. Given that the proposed NO_x and SO_2 emissions are a relatively small fraction of the NO_x and SO_2 emissions in the air shed, and that the ambient monitoring data shows relatively small fractions of nitrate and sulfate, secondary $PM_{2.5}$ formation from the proposed project's NO_x and SO_2 emissions would be expected to be considerably smaller than the monitored concentration of nitrates.

6.2.4.2 Hybrid Qualitative/Quantitative Analysis

Chemical transformation of NO_x, SO_2, and VOC may lead to the formation of nitrate, sulfate, and organic aerosols, which contribute to levels of $PM_{2.5}$ in the atmosphere. These aerosols are termed "secondary" $PM_{2.5}$, because they are emitted from the source in gaseous form. USEPA has recently proposed draft modeling requirements for sources subject to PSD review, that include consideration of secondary as well as primary impacts on $PM_{2.5}$ (USEPA, 2013).

Impacts of the Project on secondary $PM_{2.5}$ levels have been estimated using the "hybrid" modeling approach described in the proposed USEPA guidance. The oxidation of NO_x and SO_2 is a regional-scale process, and is addressed most appropriately via regional-scale modeling. Such modeling has been undertaken for the northern Midwest region during the last two decades by LADCO to provide information for development of SIPs for ozone and for $PM_{2.5}$ for the five-state region consisting of Wisconsin, Illinois, Indiana, Michigan, and Ohio. The most recent (Round 4) modeling was performed using the regional photochemical model CAMx. Impacts were evaluated for a number of control scenarios.

The "hybrid" modeling approach described by USEPA uses regional modeling results to determine the sensitivity of predicted $PM_{2.5}$ concentrations to changes in regional emissions of primary precursor pollutants. This sensitivity can then be applied to estimate the potential contribution to secondary $PM_{2.5}$ formation expected to result from an emissions increase of precursor pollutants from a proposed new source.

6.2.4.3 $PM_{2.5}$ Sensitivity Based on LADCO Round 4 Results

To assess the sensitivity of predicted $PM_{2.5}$ levels to emissions of NO_x and SO_2, predicted impacts at Ohio receptors were compared for two LADCO Round 4 scenarios: 2012 Scenario 1a (Base) and 2012 Scenario 2c (EGU 2). These scenarios were chosen because they entail large changes in emissions for NO_x and SO_2, but no difference for other pollutants (specifically, Scenario 1a and 2c have the same primary $PM_{2.5}$ emissions). The change in predicted impacts between these two scenarios is, therefore, a direct indication of the sensitivity of $PM_{2.5}$ to emissions of SO_2 and NO_x.

The emissions for the five-state LADCO region for the two scenarios are compared in Table 17. Regional combined emissions of NO_x and SO_2 for Scenario 2c are 35.9 percent lower than the Base emission rates reflected in Scenario 1a.

The LADCO Round 4 modeling report provides predicted annual average levels of $PM_{2.5}$ for 22 monitoring sites in Ohio. The effect of reducing NO_x and SO_2 emissions by 35.9 percent (the difference between Scenario 1a and 2c) was a 1.0 to 1.2 μg/m^3 reduction in annual $PM_{2.5}$ concentrations at all 22 Ohio sites. The Round 4 summary report does not provide detailed tables for predicted peak 24-hour impacts. The plots of predicted results for the 2012 base case indicate that peak 24-hour concentrations are higher than annual predictions by a factor of 3 to 4. For the purposes of this assessment, the sensitivity of a 35.9 percent reduction in NO_x and SO_2 emissions on 24-hour $PM_{2.5}$ concentrations was conservatively estimated to be 6.0 μg/m^3 (five times the annual sensitivity).

Table 17: Comparison of Regional Emissions by LADCO Modeling Scenario

Pollutant	Emissions (tpd)			Percent Change
	2012 base	EGU 2	Change (base – EGU 2)	
NO_x for 5-state region	6,131	5,433	-698	11.4%
SO_2 for 5-state region	5,928	2,293	-3,635	61.3%
Total NO_x + SO_2	12,059	7,726	-4,333	35.9%
Source: Round 4 emissions summary (LADCO website)				

6.2.4.4 Estimated Impacts on Secondary PM2.5

The change in regional emissions was estimated by comparing the Project emissions to the 2011 National Emission Inventory (NEI) regional baseline. (Detailed emission tables by county were not available for the 2012 inventory.) To estimate regional emissions, a 12-county region around the Project (Defiance, Fulton, Handcock, Henry, Lucas, Ottawa, Paulding, Putnam, Sandusky, Seneca, Williams, and Wood Counties) was defined. This region extends roughly 100 miles East-West by 60 miles North-South. The modeling grid used for $PM_{2.5}$ in CAMx has 36-km spacing, so this region is roughly three grid squares North-South by four grid squares East-West.

The 2011 NEI emissions for this region total 212.5 tpd of NO_x and 64.5 tpd of SO_2, for a total of 277.0 tpd of both precursor pollutants. By comparison, emissions associated with the Project are 0.53 tpd of NO_x and 0.10 tpd of SO_2, for a total of 0.63 tpd. Project emissions of NO_x and SO_2 represent 0.23 percent of regional precursor emissions.

Using the sensitivity determined from LADCO modeling, a 35.9 percent change in NO_x and SO_2 emissions from the 12-county area would be expected to result in a maximum change in annual $PM_{2.5}$ concentrations of 1.2 $\mu g/m^3$; as previously discussed, the same emissions change would be expected to have a 6.0 $\mu g/m^3$ change in 24-hour $PM_{2.5}$ concentrations. Scaling the effect of the Project NO_x and SO_2 emission rate (0.64 tpd), the estimated impacts associated with the Project on secondary $PM_{2.5}$ are 0.0076 $\mu g/m^3$ (annual average) and 0.038 $\mu g/m^3$ (24-hour average). It is important to note that these impacts will not be experienced in the same location as the Project's maximum primary $PM_{2.5}$ impacts, as the secondary particulate formation will occur well downwind of the Project. Further, these levels represent an insignificant fraction of existing $PM_{2.5}$ background levels.

For the reasons stated above, it is believed that the modeling or 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.

ATTACHMENT A

Revised Siemens Performance Data

SIEMENS

NAPD - Oregon Clean Energy Center

Estimated SCC6-8000H Exhaust Stack Emissions

Combined Cycle / PCS Combustor

Estimated Emissions Data Sheet

August 1,2014

SITE CONDITIONS:	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12	CASE 13	CASE 14	CASE 15	CASE 16
CONFIGURATION	2x1-DB	2x1	2x1-DB	2x1	2x1-DB	2x1	2x1	1x1-DB	1x1	1x1-DB	1x1	2x1-SU	2x1-SU	2x1-SU	2x0-STB	2x0-STB
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT LOAD LEVEL, %	100	100	100	60	100	100	60	100	100	100	60	100	100	60	100	100
NET FUEL HEATING VALUE, Btu/lb$_m$ (LHV)	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443
GROSS FUEL HEATING VALUE, Btu/lb$_m$ (HHV)	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
DUCT BURNING	ON	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	95	59	-8	-8	105	105	105	-8	-8	105	105	-8	105	105	-8	105
AMBIENT RELATIVE HUMIDITY, %	50	60	100	100	45	45	45	100	100	45	45	100	45	45	100	45
BAROMETRIC PRESSURE, psi$_a$	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380
GT FUEL FLOW, lb$_m$/hr	105,093	114,826	129,379	87,208	102,364	93,993	65,480	129,481	129,446	102,427	65,496	129,379	93,993	65,474	129,379	93,993
DUCT BURNER FUEL FLOW, lb$_m$/hr	12,920	---	8,150	---	13,220	---	---	8,150	---	13,220	---	---	---	---	---	---
HRSG STACK EXHAUST GAS																
EXHAUST FLOW, lb$_m$/hr	4,433,176	4,829,267	5,288,079	3,624,210	4,325,104	4,086,297	3,080,976	5,288,181	5,279,997	4,325,166	3,080,993	5,279,929	4,086,297	3,080,981	5,279,929	4,086,297
HRSG STACK TEMPERATURE, °F	174	184	177	169	174	181	177	173	174	165	171	177	174	167	181	185
OXYGEN, Vol. %	10.45	11.87	11.21	11.96	10.30	11.78	12.41	11.20	11.79	10.29	12.41	11.80	11.78	12.41	11.80	11.78
CARBON DIOXIDE, Vol. %	4.53	4.10	4.48	4.17	4.54	3.94	3.65	4.49	4.25	4.54	3.65	4.24	3.94	3.65	4.24	3.94
WATER, Vol. %	11.94	9.16	8.77	8.16	12.65	10.95	10.38	8.77	8.31	12.65	10.39	8.30	10.95	10.38	8.30	10.95
NITROGEN, Vol. %	71.87	74.00	74.32	74.84	71.33	72.49	72.71	74.32	74.78	71.33	72.71	74.78	72.49	72.71	74.78	72.49
ARGON, Vol. %	1.20	1.22	1.22	1.23	1.19	1.21	1.21	1.22	1.23	1.19	1.21	1.23	1.21	1.21	1.23	1.21
MOLECULAR WEIGHT	28.10	28.47	28.44	28.59	28.03	28.26	28.30	28.44	28.58	28.03	28.30	28.58	28.26	28.30	28.58	28.26
HRSG EXHAUST STACK EMISSIONS (Based on USEPA Test Methods):																
NO_X, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NO_X, lb$_m$/hr as NO_2	20.2	19.5	23.6	14.8	19.8	15.9	11.1	23.6	22.0	19.8	11.1	22.0	15.9	11.1	22.0	15.9
NO_X, lb$_m$/MMBtu	0.0075	0.0075	0.0076	0.0075	0.0076	0.0075	0.0075	0.0076	0.0075	0.0076	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075
NH_3, ppmvd @ 15% O_2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH_3, lb$_m$/hr	18.7	18.0	21.8	13.7	18.3	14.7	10.3	21.8	20.3	18.3	10.3	20.3	14.7	10.3	20.3	14.7
CO, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO, lb$_m$/hr	12.3	11.9	14.4	9.0	12.1	9.7	6.8	14.4	13.0	12.1	6.8	13.0	9.7	6.8	13.0	9.7
CO, lb$_m$/MMBtu	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0044	0.0046	0.0046	0.0044	0.0046	0.0046	0.0044	0.0046
VOC, ppmvd @ 15% O_2 as CH_4	1.7	1	1.4	1	1.7	1	1	1.4	1	1.7	1	1	1	1	1	1
VOC, lb$_m$/hr as CH_4	5.9	3.4	5.9	2.6	5.9	2.8	2.0	5.9	3.9	5.9	2.0	3.9	2.8	2.0	3.9	2.8
VOC, lb$_m$/MMBtu	0.0022	0.0013	0.0019	0.0013	0.0023	0.0013	0.0013	0.0019	0.0013	0.0022	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
SO_2, lb$_m$/hr	4.0	3.9	4.7	3.0	4.0	3.2	2.3	4.7	4.4	4.0	2.3	4.4	3.2	2.3	4.4	3.2
SO_2, lb$_m$/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	0.0015	0.0015
H_2SO_4, lb$_m$/hr	1.5	1.4	1.5	1.1	1.4	1.2	0.8	1.5	1.6	1.4	0.8	1.6	1.2	0.8	1.6	1.2
H_2SO_4, lb$_m$/MMBtu	0.00056	0.00054	0.00048	0.00056	0.00053	0.00056	0.00054	0.00048	0.00055	0.00053	0.00054	0.00055	0.00056	0.00054	0.00055	0.00056
PARTICULATES, lb$_m$/hr	14.0	11.9	15.1	8.0	13.7	9.9	8.0	15.1	13.3	13.7	8.0	13.3	9.9	8.0	13.3	9.9
PARTICULATES, lb$_m$/MMBtu	0.0052	0.0046	0.0048	0.0040	0.0052	0.0046	0.0054	0.0048	0.0045	0.0052	0.0054	0.0045	0.0046	0.0054	0.0045	0.0046
CO_2, lb$_m$/hr	324,061	315,453	377,709	239,579	317,373	258,243	180,026	377,985	355,566	317,545	180,068	355,382	258,243	180,010	355,382	258,243

NOTES:

- All data is ESTIMATED, NOT guaranteed and is for ONE unit (gas turbine and HRSG).
- Gas fuel composition is 96.771% CH_4, 1.129% C_2H_6, 0.093% C_3H_8, 0.014% n-C_4H_{10}, 0.014% i-C_4H_{10}, 0.004% i-C_5H_{12}, 0.004% n-C_5H_{12}, 0.009% C6H14, 0.242% N_2, 1.68% CO_2, 0.005% H_2, 0.035% He, and 0.5 grains Sulfur per 100 SCF.
- Gas fuel must be in compliance with the Siemens Gas Fuel Specification.
- NO_X emissions assume the use of an SCR system with ammonia injection.
- CO and VOC emissions assume the use of an oxidation catalyst.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH_4).
- Particulates are per US EPA Method 5 and 202 (front and back half).
- H_2SO_4 emissions are a subset of the total Particulate emissions (i.e., NOT added to particulates).
- Emission estimates in units of lb$_m$/MMBtu are based on fuel higher heating value (HHV).
- Emissions exclude ambient air contributions and assume steady-state conditions.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only.
  Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility. Siemens is available to review permit application data upon request.

SIEMENS

NAPD - Oregon Clean Energy Center

Estimated SCC6-8000H Exhaust Stack Emissions
Combined Cycle / PCS Combustor

SITE CONDITIONS:	CASE 17	CASE 18	CASE 19	CASE 20	CASE 22	CASE 23	CASE 24	CASE 25	CASE 26	CASE 27	CASE 30	CASE 31	CASE 32	CASE 33	CASE 34	CASE 35
CONFIGURATION	2x0-STB	2x0-STB-SU	2x0-STB-SU	2x0-STB-DB	1x0-STB	1x0-STB-SU	2x0-STB-DB	1x0-STB-DB	1x0-STB-DB	2x1	2x1	2x1-DB	2x1	2x1	2x1	2x1
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT LOAD LEVEL, %	100	100	60	100	100	100	100	100	100	100	75	100	75	60	100	75
NET FUEL HEATING VALUE, Btu/lb_m (LHV)	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443	20,443
GROSS FUEL HEATING VALUE, Btu/lb_m (HHV)	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF
DUCT BURNING	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	-8	105	105	105	-8	-8	-8	-8	105	-8	-8	59	59	59	105	105
AMBIENT RELATIVE HUMIDITY, %	100	45	45	45	100	100	100	100	45	100	100	60	60	60	45	45
BAROMETRIC PRESSURE, psi_a	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380
GT FUEL FLOW, lb_m/hr	129,470	94,038	65,495	93,993	129,428	129,480	129,419	129,471	94,024	129,379	102,012	114,826	89,614	76,853	102,364	75,945
DUCT BURNER FUEL FLOW, lb_m/hr	---	---	---	13,220	---	---	8,150	8,150	13,220	---	---	10,175	---	---	---	---
HRSG STACK EXHAUST GAS																
EXHAUST FLOW, lb_m/hr	5,280,020	4,086,341	3,081,014	4,099,517	5,279,978	5,280,030	5,288,119	5,288,171	4,099,547	5,279,929	4,117,800	4,839,441	3,835,497	3,401,942	4,311,884	3,445,856
HRSG STACK TEMPERATURE, °F	173	180	169	178	171	168	178	173	181	183	171	176	172	170	184	179
OXYGEN, Vol. %	11.79	11.77	12.41	10.60	11.80	11.79	11.21	11.20	10.60	11.80	11.70	11.08	12.06	12.34	11.41	12.12
CARBON DIOXIDE, Vol. %	4.25	3.94	3.65	4.45	4.24	4.25	4.48	4.48	4.45	4.24	4.29	4.43	4.04	3.91	4.05	3.78
WATER, Vol. %	8.31	10.95	10.39	11.91	8.31	8.31	8.77	8.77	11.92	8.30	8.39	9.80	8.81	8.56	11.74	10.64
NITROGEN, Vol. %	74.78	72.49	72.71	71.84	74.78	74.78	74.32	74.32	71.84	74.78	74.74	73.48	74.23	74.33	71.95	72.61
ARGON, Vol. %	1.23	1.21	1.21	1.20	1.23	1.23	1.22	1.22	1.20	1.23	1.23	1.22	1.23	1.23	1.20	1.21
MOLECULAR WEIGHT	28.58	28.26	28.30	28.10	28.58	28.58	28.44	28.44	28.10	28.58	28.57	28.33	28.50	28.52	28.19	28.28
HRSG EXHAUST STACK EMISSIONS (Based on USEPA Test Methods):																
NO_X, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NO_X, lb_m/hr as NO_2	22.0	15.9	11.1	18.4	22.0	22.0	23.6	23.6	18.4	22.0	17.3	21.0	15.2	13.0	17.3	12.9
NO_X, lb_m/MMBtu	0.0075	0.0075	0.0075	0.0076	0.0075	0.0075	0.0076	0.0076	0.0076	0.0075	0.0075	0.0074	0.0075	0.0075	0.0075	0.0075
NH_3, ppmvd @ 15% O_2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH_3, lb_m/hr	20.3	14.7	10.3	17.0	20.3	20.3	21.8	21.8	17.0	20.3	16.0	19.8	14.1	12.1	16.1	11.9
CO, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO, lb_m/hr	13.0	9.7	6.8	11.2	13.0	13.0	14.4	14.4	11.2	13.0	10.5	13.0	9.3	8.0	10.6	7.9
CO, lb_m/MMBtu	0.0044	0.0045	0.0046	0.0046	0.0044	0.0044	0.0046	0.0046	0.0046	0.0044	0.0045	0.0046	0.0046	0.0046	0.0046	0.0046
VOC, ppmvd @ 15% O_2 as CH_4	1	1	1	1.8	1	1	1.4	1.4	1.8	1	1	1.6	1	1	1	1
VOC, lb_m/hr as CH_4	3.9	2.8	2.0	5.9	3.9	3.9	5.9	5.9	5.9	3.9	3.1	5.9	2.7	2.3	3.1	2.3
VOC, lb_m/MMBtu	0.0013	0.0013	0.0013	0.0024	0.0013	0.0013	0.0019	0.0019	0.0024	0.0013	0.0013	0.0021	0.0013	0.0013	0.0013	0.0013
SO_2, lb_m/hr	4.4	3.2	2.3	3.7	4.4	4.4	4.7	4.7	3.7	4.4	3.5	4.3	3.1	2.6	3.5	2.6
SO_2, lb_m/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	0.0015	0.0015
H_2SO_4, lb_m/hr	1.6	1.2	0.8	1.3	1.6	1.6	1.5	1.5	1.3	1.6	1.3	1.5	1.1	1.0	1.3	1.0
H_2SO_4, lb_m/MMBtu	0.00055	0.00056	0.00054	0.00053	0.00055	0.00054	0.00048	0.00048	0.00053	0.00055	0.00056	0.00053	0.00054	0.00057	0.00056	0.00058
PARTICULATES, lb_m/hr	13.3	9.9	8.0	13.2	13.3	13.3	14.8	14.8	13.2	13.1	10.2	14.0	9.4	8.4	10.4	8.5
PARTICULATES, lb_m/MMBtu	0.0045	0.0046	0.0054	0.0054	0.0045	0.0045	0.0047	0.0047	0.0054	0.0045	0.0044	0.0049	0.0046	0.0048	0.0045	0.0049
CO_2, lb_m/hr	355,630	258,365	180,067	294,460	355,514	355,657	377,819	377,959	294,543	355,382	280,187	343,326	246,228	211,224	281,156	208,731

NOTES:

- All data is ESTIMATED, NOT guaranteed and is for ONE unit (gas turbine and HRSG).
- Gas fuel composition is 96.771% CH_4, 1.129% C_2H_6, 0.093% C_3H_8, 0.014% n-C_4H_{10}, 0.014% i-C_4H_{10}, 0.004% i-C_5H_{12}, 0.004% n-C_5H_{12}, 0.009% C6H14, 0.242% N_2, 1.68% CO_2, 0.005% H_2, 0.035% He, and 0.5 grains Sulfur per 100 SCF.
- Gas fuel must be in compliance with the Siemens Gas Fuel Specification.
- NO_X emissions assume the use of an SCR system with ammonia injection.
- CO and VOC emissions assume the use of an oxidation catalyst.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH_4).
- Particulates are per US EPA Method 5 and 202 (front and back half).
- H_2SO_4 emissions are a subset of the total Particulate emissions (i.e., NOT added to particulates).
- Emission estimates in units of lb_m/MMBtu are based on fuel higher heating value (HHV).
- Emissions exclude ambient air contributions and assume steady-state conditions.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only.
  Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility. Siemens is available to review permit application data upon request.

ATTACHMENT B

Revised Potential to Emit Calculations

Summary of Facility-Wide Potential Annual Emissions - Siemens SCC6-8000H **8/1/2014**
Oregon Clean Energy

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)	Facility Total (tpy)
NO_x	92.0	92.0	1.98	6.95	0.43	193.3
CO	91.3	91.3	5.45	4.34	0.43	192.7
VOC	38.5	38.5	0.59	0.98	0.06	78.6
SO_2	18.8	18.8	0.14	0.008	0.001	37.8
PM	61.3	61.3	0.79	0.25	0.02	123.7
PM_{10}	61.3	61.3	0.79	0.25	0.02	123.7
$PM_{2.5}$	61.3	61.3	0.79	0.25	0.02	123.7
CO_2	1,475,571	1,475,571	11,647	875	86.25	2,963,751
CH_4	27.4	27.4	0.223	0.048	0.0167	55.0
N_2O	2.74	2.74	0.062	0.007	0.0007	5.54
CO_2e	1,477,071	1,477,071	11,671	878	87	2,966,779
H_2SO_4	6.57	6.57	0.01	0.0002	0.00002	13.2
Lead (Pb)	6.1E-03	6.1E-03	2.10E-04	7.39E-05	7.35E-06	0.012
NH_3	86.7	86.7	0	0	0	173.4
Formaldehyde	1.35	1.35	3.25E-02	4.16E-04	6.20E-04	2.7
Toluene	1.49	1.49	1.47E-03	1.48E-03	2.15E-04	3.0
Xylenes	0.73	0.73	0	1.02E-03	1.50E-04	1.5
Total HAPS	6.88	6.88	8.19E-01	5.65E-03	7.66E-03	14.6

Summary of Siemens SCC6-8000H Emissions Data (August 1, 2014 Estimated Stack Emissions Data)
Oregon Clean Energy

Siemens Case #	**Case 3**	**Case 12**	**Case 30**	**Case 4**	**Case 31**	**Case 2**	**Case 32**	**Case 33**	**Case 5**	**Case 34**
Number of GTs Operating	2	2	2	2	2	2	2	2	2	2
GT Load %	100	100	75	60	100	100	75	60	100	100
GROSS FUEL HEATING VALUE, Btu/lbm (HH	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DUCT BURNING	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
AMBIENT DRY BULB TEMPERATURE, °F	-8	-8	-8	-8	59	59	59	59	105	105
AMBIENT RELATIVE HUMIDITY, %	100	100	100	100	60	60	60	60	45	45
BAROMETRIC PRESSURE, psia	14.38	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	129,379	129,379	102,012	87,208	114,826	114,826	89,614	76,853	102,364	102,364
GT FUEL FLOW, MMBtu/hr (HHV)	2,934	2,934	2,313	1,977	2,604	2,604	2,032	1,743	2,321	2,321
GT FUEL FLOW, MMSCFH	2.85	2.85	2.25	1.92	2.53	2.53	1.98	1.70	2.26	2.26
DUCT BURNER FUEL FLOW, lbm/hr	8,150				10,175				13,220	
DUCT BURNER FUEL FLOW, MMBtu/hr (HH	185				231				300	
DUCT BURNER FUEL FLOW, MMSCFH	0.18				0.22				0.29	
Plant Output, kW (Gross)	---	---	---	---	883,800	826,300	---	---	---	---
HRSG STACK EXHAUST GAS										
EXHAUST FLOW, lbm/hr	5,288,079	5,279,929	4,117,800	3,624,210	4,839,441	4,829,267	3,835,497	3,401,942	4,325,104	4,311,884
HRSG STACK TEMPERATURE, °F	177	177	171	169	176	184	172	170	174	184
O2%	11.21	11.80	11.70	11.96	11.08	11.87	12.06	12.34	10.30	11.41
CO2%	4.48	4.24	4.29	4.17	4.43	4.10	4.04	3.91	4.54	4.05
H2O%	8.77	8.30	8.39	8.16	9.80	9.16	8.81	8.56	12.65	11.74
N2%	74.32	74.78	74.74	74.84	73.48	74.00	74.23	74.33	71.33	71.95
Ar%	1.22	1.23	1.23	1.23	1.22	1.22	1.23	1.23	1.19	1.20
Molecular Weight (lb/lb-mole)	28.45	28.58	28.57	28.59	28.33	28.47	28.51	28.53	28.03	28.18
HRSG EXHAUST STACK EMISSIONS (Based on USEPA Test Methods):										
NOx, ppmvd @ 15% O2	2	2	2	2	2	2	2	2	2	2
NOX, lbm/hr as NO2	23.6	22.0	17.3	14.8	21.0	19.5	15.2	13.0	19.8	17.3
NOX, lbm/MMBtu	0.0076	0.0075	0.0075	0.0075	0.0076	0.0075	0.0075	0.0075	0.0076	0.0075
NH3, ppmvd @ 15% O2	5	5	5	5	5	5	5	5	5	5
NH3, lbm/hr	21.8	20.3	16.0	13.7	19.8	18.0	14.1	12.1	18.3	16.1
CO, ppmvd @ 15% O2	2	2	2	2	2	2	2	2	2	2
CO, lbm/hr	14.4	13.0	10.5	9.0	13.0	11.9	9.3	8.0	12.1	10.6
CO, lbm/MMBtu	0.0046	0.0044	0.0045	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046

Summary of Siemens SCC6-8000H Emissions Data (August 1, 2014 Estimated Stack Emissions Data)
Oregon Clean Energy

Siemens Case #	**Case 3**	**Case 12**	**Case 30**	**Case 4**	**Case 31**	**Case 2**	**Case 32**	**Case 33**	**Case 5**	**Case 34**
Number of GTs Operating	2	2	2	2	2	2	2	2	2	2
GT Load %	100	100	75	60	100	100	75	60	100	100
GROSS FUEL HEATING VALUE, Btu/lbm (HH	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DUCT BURNING	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
AMBIENT DRY BULB TEMPERATURE, °F	-8	-8	-8	-8	59	59	59	59	105	105
AMBIENT RELATIVE HUMIDITY, %	100	100	100	100	60	60	60	60	45	45
BAROMETRIC PRESSURE, psia	14.38	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	129,379	129,379	102,012	87,208	114,826	114,826	89,614	76,853	102,364	102,364
GT FUEL FLOW, MMBtu/hr (HHV)	2,934	2,934	2,313	1,977	2,604	2,604	2,032	1,743	2,321	2,321
GT FUEL FLOW, MMSCFH	2.85	2.85	2.25	1.92	2.53	2.53	1.98	1.70	2.26	2.26
DUCT BURNER FUEL FLOW, lbm/hr	8,150				10,175				13,220	
DUCT BURNER FUEL FLOW, MMBtu/hr (HH	185				231				300	
DUCT BURNER FUEL FLOW, MMSCFH	0.18				0.22				0.29	
Plant Output, kW (Gross)	---	---	---	---	883,800	826,300	---	---	---	---
VOC, ppmvd @ 15% O2 as CH4	1.4	1	1.0	1	1.6	1	1	1	1.7	1
VOC, lbm/hr as CH4	5.9	3.9	3.1	2.6	5.9	3.4	2.7	2.3	5.9	3.1
VOC, lbm/MMBtu	0.0019	0.0013	0.0013	0.0013	0.0021	0.0013	0.0013	0.0013	0.0023	0.0013
SO2, lbm/hr	4.7	4.4	3.5	3.0	4.3	3.9	3.1	2.6	4.0	3.5
SO2, lbm/MMBtu	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
H2SO4, lbm/hr	1.5	1.6	1.3	1.1	1.5	1.4	1.1	1.0	1.4	1.3
H2SO4, lbm/MMBtu	0.0005	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0006	0.0005	0.0006
PARTICULATES, lbm/hr	15.1	13.3	10.2	8.0	14.0	11.9	9.4	8.4	13.7	10.4
PARTICULATES, lbm/MMBtu	0.0048	0.0045	0.0044	0.0040	0.0049	0.0046	0.0046	0.0048	0.0052	0.0045
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	370,652	348,687	274,931	235,033	336,888	309,466	241,517	207,125	311,509	275,880
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	6.88	6.47	5.10	4.36	6.25	5.74	4.48	3.84	5.78	5.12
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	0.69	0.65	0.51	0.44	0.62	0.57	0.45	0.38	0.58	0.51
CO2e, lb/hr	371,029	349,042	275,211	235,272	337,231	309,781	241,763	207,336	311,825	276,160
CO2e, lb/MW-hr (gross, new & clean)	---	---	---	---	763.1	749.8	---	---	---	---

Summary of Siemens SCC6-8000H Emissions Data (August 1, 2014 Estimated Stack Emissions Data)
Oregon Clean Energy

Siemens Case #	Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34
Number of GTs Operating	2	2	2	2	2	2	2	2	2	2
GT Load %	100	100	75	60	100	100	75	60	100	100
GROSS FUEL HEATING VALUE, Btu/lbm (HH	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DUCT BURNING	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
AMBIENT DRY BULB TEMPERATURE, °F	-8	-8	-8	-8	59	59	59	59	105	105
AMBIENT RELATIVE HUMIDITY, %	100	100	100	100	60	60	60	60	45	45
BAROMETRIC PRESSURE, psia	14.38	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	129,379	129,379	102,012	87,208	114,826	114,826	89,614	76,853	102,364	102,364
GT FUEL FLOW, MMBtu/hr (HHV)	2,934	2,934	2,313	1,977	2,604	2,604	2,032	1,743	2,321	2,321
GT FUEL FLOW, MMSCFH	2.85	2.85	2.25	1.92	2.53	2.53	1.98	1.70	2.26	2.26
DUCT BURNER FUEL FLOW, lbm/hr	8,150				10,175				13,220	
DUCT BURNER FUEL FLOW, MMBtu/hr (HH'	185				231				300	
DUCT BURNER FUEL FLOW, MMSCFH	0.18				0.22				0.29	
Plant Output, kW (Gross)	---	---	---	---	883,800	826,300	---	---	---	---
Formaldehyde (CT, lb/MMBtu)	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04	1.12E-04
Formaldehyde (DB, lb/MMBtu)	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05	7.50E-05
Formaldehyde (lb/hr)	3.42E-01	3.29E-01	2.59E-01	2.21E-01	3.09E-01	2.92E-01	2.28E-01	1.95E-01	2.82E-01	2.60E-01
Toluene (CT, lb/MMBtu)	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04	1.30E-04
Toluene (DB, lb/MMBtu)	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06	3.40E-06
Toluene (lb/hr)	3.82E-01	3.81E-01	3.01E-01	2.57E-01	3.39E-01	3.38E-01	2.64E-01	2.27E-01	3.03E-01	3.02E-01
Xylene (CT, lb/MMBtu)	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05	6.40E-05
Xylene (DB, lb/MMBtu)										
Xylene (lb/hr)	1.88E-01	1.88E-01	1.48E-01	1.27E-01	1.67E-01	1.67E-01	1.30E-01	1.12E-01	1.49E-01	1.49E-01
Lead (CT, lb/MMBtu)	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07	4.90E-07
Lead (DB, lb/MMBtu)	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07	4.84E-07
Lead (lb/hr)	1.53E-03	1.44E-03	1.13E-03	9.69E-04	1.39E-03	1.28E-03	9.96E-04	8.54E-04	1.28E-03	1.14E-03
Total HAPs (CT, lb/MMBtu)	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04	4.36E-04
Total HAPs (DB, lb/MMBtu)	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03
Total HAPs (lb/hr)	1.63E+00	1.28E+00	1.01E+00	8.61E-01	1.57E+00	1.13E+00	8.85E-01	7.59E-01	1.58E+00	1.01E+00

Summary of Siemens SCC6-8000H Emissio
Oregon Clean Energy

Siemens Case #	Case 13	Case 35	Case 7
Number of GTs Operating	2	2	2
GT Load %	100	75	60
GROSS FUEL HEATING VALUE, Btu/lbm (HI	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF
DUCT BURNING	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	105	105	105
AMBIENT RELATIVE HUMIDITY, %	45	45	45
BAROMETRIC PRESSURE, psia	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	93,993	75,945	65,480
GT FUEL FLOW, MMBtu/hr (HHV)	2,131	1,722	1,485
GT FUEL FLOW, MMSCFH	2.07	1.68	1.44
DUCT BURNER FUEL FLOW, lbm/hr			
DUCT BURNER FUEL FLOW, MMBtu/hr (HH			
DUCT BURNER FUEL FLOW, MMSCFH			
Plant Output, kW (Gross)	---	---	---

HRSG STACK EXHAUST GAS

EXHAUST FLOW, lbm/hr	4,086,297	3,445,856	3,080,976
HRSG STACK TEMPERATURE, °F	174	179	177
O2%	11.78	12.12	12.41
CO2%	3.94	3.78	3.65
H2O%	10.95	10.64	10.38
N2%	72.49	72.61	72.71
Ar%	1.21	1.21	1.21
Molecular Weight (lb/lb-mole)	28.27	28.28	28.30

HRSG EXHAUST STACK EMISSIONS (Base

NOx, ppmvd @ 15% O2	2	2	2
NOX, lbm/hr as NO2	15.9	12.9	11.1
NOX, lbm/MMBtu	0.0075	0.0075	0.0075
NH3, ppmvd @ 15% O2	5	5	5
NH3, lbm/hr	14.7	11.9	10.3
CO, ppmvd @ 15% O2	2	2	2
CO, lbm/hr	9.7	7.9	6.8
CO, lbm/MMBtu	0.0046	0.0046	0.0046

Summary of Siemens SCC6-8000H Emissio
Oregon Clean Energy

Siemens Case #	**Case 13**	**Case 35**	**Case 7**
Number of GTs Operating	2	2	2
GT Load %	100	75	60
GROSS FUEL HEATING VALUE, Btu/lbm (HH	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF
DUCT BURNING	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	105	105	105
AMBIENT RELATIVE HUMIDITY, %	45	45	45
BAROMETRIC PRESSURE, psia	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	93,993	75,945	65,480
GT FUEL FLOW, MMBtu/hr (HHV)	2,131	1,722	1,485
GT FUEL FLOW, MMSCFH	2.07	1.68	1.44
DUCT BURNER FUEL FLOW, lbm/hr			
DUCT BURNER FUEL FLOW, MMBtu/hr (HH'			
DUCT BURNER FUEL FLOW, MMSCFH			
Plant Output, kW (Gross)	---	---	---
VOC, ppmvd @ 15% O2 as CH4	1	1	1
VOC, lbm/hr as CH4	2.8	2.3	2.0
VOC, lbm/MMBtu	0.0013	0.0013	0.0013
SO2, lbm/hr	3.2	2.6	2.3
SO2, lbm/MMBtu	0.0015	0.0015	0.0015
H2SO4, lbm/hr	1.2	1.0	0.8
H2SO4, lbm/MMBtu	0.0006	0.0006	0.0005
PARTICULATES, lbm/hr	9.9	8.5	8.0
PARTICULATES, lbm/MMBtu	0.0046	0.0049	0.0054
CO_2, lb/hr (40 CFR 75, App. G, Eq. G-4)	253,319	204,678	176,474
CH_4, lb/hr (40 CFR 98, Subpart C, Table 2)	4.70	3.80	3.27
N_2O, lb/hr (40 CFR 98, Subpart C, Table 2)	0.47	0.38	0.33
CO2e, lb/hr	253,577	204,886	176,654
CO2e, lb/MW-hr (gross, new & clean)	---	---	---

Summary of Siemens SCC6-8000H Emissio
Oregon Clean Energy

Siemens Case #	Case 13	Case 35	Case 7
Number of GTs Operating	2	2	2
GT Load %	100	75	60
GROSS FUEL HEATING VALUE, Btu/lbm (HH	22,675	22,675	22,675
EVAPORATIVE COOLER STATUS	OFF	OFF	OFF
DUCT BURNING	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	105	105	105
AMBIENT RELATIVE HUMIDITY, %	45	45	45
BAROMETRIC PRESSURE, psia	14.380	14.380	14.380
GT FUEL FLOW, lbm/hr	93,993	75,945	65,480
GT FUEL FLOW, MMBtu/hr (HHV)	2,131	1,722	1,485
GT FUEL FLOW, MMSCFH	2.07	1.68	1.44
DUCT BURNER FUEL FLOW, lbm/hr			
DUCT BURNER FUEL FLOW, MMBtu/hr (HH			
DUCT BURNER FUEL FLOW, MMSCFH			
Plant Output, kW (Gross)	---	---	---
Formaldehyde (CT, lb/MMBtu)	1.12E-04	1.12E-04	1.12E-04
Formaldehyde (DB, lb/MMBtu)	7.50E-05	7.50E-05	7.50E-05
Formaldehyde (lb/hr)	2.39E-01	1.93E-01	1.66E-01
Toluene (CT, lb/MMBtu)	1.30E-04	1.30E-04	1.30E-04
Toluene (DB, lb/MMBtu)	3.40E-06	3.40E-06	3.40E-06
Toluene (lb/hr)	2.77E-01	2.24E-01	1.93E-01
Xylene (CT, lb/MMBtu)	6.40E-05	6.40E-05	6.40E-05
Xylene (DB, lb/MMBtu)			
Xylene (lb/hr)	1.36E-01	1.10E-01	9.50E-02
Lead (CT, lb/MMBtu)	4.90E-07	4.90E-07	4.90E-07
Lead (DB, lb/MMBtu)	4.84E-07	4.84E-07	4.84E-07
Lead (lb/hr)	1.04E-03	8.44E-04	7.28E-04
Total HAPs (CT, lb/MMBtu)	4.36E-04	4.36E-04	4.36E-04
Total HAPs (DB, lb/MMBtu)	1.89E-03	1.89E-03	1.89E-03
Total HAPs (lb/hr)	9.28E-01	7.50E-01	6.47E-01

Summary of Startup and Shutdown Emissions - Siemens SCC6-8000H
Oregon Clean Energy

Startup/Shutdown Operating Data

hot starts/unit	250	number/yr	1.37	hours/even	8	Min hours downtin	9.37	hrs/event
warm starts/unit	0	number/yr	1.63	hours/even	16	Min hours downtin	17.63	hrs/event
cold starts/unit	50	number/yr	3.00	hours/even	64	Min hours downtin	67.00	hrs/event
shutdowns/unit	300	number/yr	0.43	hours/even	N/A	---	N/A	hrs/event

Startup/Shutdown Emissions Self-Correcting Analysis

		NOx	CO	VOC
Emissions per hot start	lbs	105	289	114
Emissions per warm start	lbs	129	351	138
Emissions per cold start	lbs	188	546	168
Emissions per shutdown	lbs	46	113	45
Shutdown/Hot start - duration (including downtime	hrs	9.80	9.80	9.80
Shutdown/Warm start - duration (including downti	hrs	18.07	18.07	18.07
Shutdown/Cold start - duration (including downtim	hrs	67.43	67.43	67.43
Shutdown/Hot start - avg hourly emissions	lb/hr	15.41	41.02	16.22
Shutdown/Warm start - avg hourly emissions	lb/hr	9.69	25.68	10.13
Shutdown/Cold start - avg hourly emissions	lb/hr	3.47	9.77	3.16
Steady state average hourly (annual)[1]	lb/hr	21.00	13.00	5.90
Hot start - self correcting?	lb/hr	yes	no	no
Warm start - self correcting?	lb/hr	yes	no	no
Cold start - self correcting?	lb/hr	yes	yes	yes

[1] Based upon Siemens Case 22 (100% load @ 59F with duct firing)

Startup/Shutdown Potential Emissions Increase (tpy/unit)

SUSD Type	Gas NOx	Gas CO	Gas VOC
Shutdown/Hot Start	-	34.33	12.65
Shutdown/Warm Start	-	0.00	0.00
Shutdown/Cold Start	-	-	-
TOTAL	**0.00**	**34.33**	**12.65**

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

ATTACHMENT C

Revised Permit Application Forms

Ohio EPA

Ohio Environmental Protection Agency
Lazarus Government Center
50 West Town Street, Suite 700
P.O. Box 1049
Columbus, Ohio 43216-1049

Application for Permit to Install (PTI) and Permit to Install/Operate (PTIO)

For EPA Use Only

Application Number ____________________

Date Received ____________________

Facility Information

Note: Application is incomplete if all **bolded** questions throughout the application are not completed.

Legal Facility Name	Oregon Clean Energy Center
Alternate Name (if any)	
Facility Physical Address	816 N. Lallendorf Road
City, ZIP code	Oregon, OH 43616
County	Lucas County
Facility ID	0448020102
Facility Description	800 MW combined cycle gas turbine (CCGT) facility
NAICS Code	221112
Facility Latitude	41 degrees 40 minutes 2 seconds
Facility Longitude	-83 degrees 26 minutes 37 seconds
Core Place ID (if known)	
SCSC ID (if known)	
Portable?	☐ Yes ☒ No
Portable Type	☐ Asphalt Plant ☐ Concrete Plant ☐ Generator ☐ Aggregate Processing ☐ Concrete Crusher ☐ Grinder ☐ Other
Initial Location County	If "Other", describe:

Contact Information

☐ No change to information on file.

❶ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❷ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❸ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❹ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❺ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

❻ ☐ **Billing** ☐ **Owner** ☐ **Primary** ☐ Operator ☐ On-Site ☐ Responsible Official

First Name	Last Name	Phone	Fax	E-mail

Address 1	Address 2	City or Township	State	Zip Code

Division of Air Pollution Control
Application for Permit-to-Install or Permit-to-Install and Operate

Section I – General Application Information

This section should be filled out for each permit to install (PTI) or Permit to Install and Operate (PTIO) application. A PTI is required for all air contaminant sources (emissions units) installed or modified after January 1, 1974 that are subject to OAC Chapter 3745-77. A PTIO is required for all air contaminant sources (emissions units) that are not subject to OAC Chapter 3745-77 (Title V). See the application instructions for additional information.

For OEPA use only: ☐ Installation ☐ Request Federally enforceable restrictions
☐ Modification ☐ General Permit
☐ Renewal ☐ Other

1. Is the purpose of this application to transition from OAC Chapter 3745-77 (Title V) to OAC Chapter 3745-31 (PTIO)?

   ☐ yes ☒ no

2. **Establish PER Due Date** - Select an annual Permit Evaluation Report (PER) due date for this facility (does not apply to facilities subject to Title V, OAC Chapter 3745-77). If the PER has previously been established and a change is now desired, a PER Change Request form must be filed instead of selecting a date here.

Due Date:	For Time Period:
☐ February 15	January 1 through December 31
☐ May 15	April 1 through March 31
☐ August 15	July 1 through June 30
☐ November 15	October 1 through September 30

   ☐ PER not applicable (Title V) or due date already established
   ☐ PER Request Permit Change form attached

3. **Federal Rules Applicability** - Please check all of the appropriate boxes below.

New Source Performance Standards (NSPS) ☐ not affected ☒ subject to Subpart: KKKK

New Source Performance Standards are listed under 40 CFR 60 - Standards of Performance for New Stationary Sources. ☐ unknown ☐ exempt - explain below

National Emission Standards for Hazardous Air Pollutants (NESHAP) ☒ not affected ☐ subject to Subpart: _______
☐ unknown ☐ subject, but exempt - explain below
National Emissions Standards for Hazardous Air Pollutants are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Maximum Achievable Control Technology (MACT) ☒ not affected ☐ subject to Subpart: _______
☐ unknown ☐ subject, but exempt - explain below
The Maximum Achievable Control Technology standards are listed under 40 CFR 63 and OAC rule 3745-31-28.

Prevention of Significant Deterioration (PSD) ☐ not affected ☒ subject to regulation
☐ unknown
These rules are found under OAC rule 3745-31-10 through OAC rule 3745-31-20.

Non-Attainment New Source Review ☒ not affected ☐ subject to regulation
☐ unknown
These rules are found under OAC rule 3745-31-21 through OAC rule 3745-31-27.

112 (r) - Risk Management Plan ☒ not affected ☐ subject to regulation
☐ unknown
These rules are found under 40 CFR 68.

Title IV (Acid Rain Requirements) ☐ not affected ☒ subject to regulation

These rules are found under 40 CFR 72 and 40 CFR 73. ☐ unknown

Please explain why you checked “exempt” in this question for one or more federal rules. Identify each exemption and whether the entire facility and/or the specific air contaminant sources included in this permit application is exempted. Attach an additional page if necessary.

___

___

4. Express PTI/PTIO - Do you qualify for express PTI or PTIO processing?

☐ yes ☒ no

If yes, are you requesting express processing per OAC rule 3745-31-05?

☐ yes ☒ no

5. **Air Contaminant Sources in this Application** - Identify the air contaminant source(s) for which you are applying below. Attach additional pages if necessary. Section II of this application and an EAC form should be completed for each air contaminant source.

Emissions Unit ID*	**Company Equipment ID** (company's name for air contaminant source)	**Equipment Description** (List all equipment that are a part of this air contaminant source)
P001	CTG #1	Siemens SCC6-8000H combined cycle combustion turbine with duct burners
P002	CTG #2	Siemens SCC6-8000H combined cycle combustion turbine with duct burners

* This ID would have been created when a previous air permit was issued. If no previous permits have been issued for this air contaminant source, leave this field blank. If this air contaminant source was previously identified in STARShip applications as a “Z” source (e.g., Z001), please provide that identification and a new ID will be assigned when the PTI/PTIO is issued.

6. Trade Secret Information - Is any information included in this application being claimed as a trade secret per Ohio Revised Code (ORC) 3704.08?

☐ yes (A “non-confidential” version must also be submitted in order for this application to be deemed complete.)
☒ no

7. Permit Application Contact - Person to contact for questions about this application:

William Martin
Name | Title

20 Park Plaza, Suite 456, Boston, MA 02216
Address (Street, City/Township, State and Zip Code)

617-948-2165 | 617-948-2501 | wmartin@cme-energy.com
Phone | Fax | E-mail

8. **Authorized Signature** – OAC rule 3745-31-04 states that applications for permits to install or permits to install and operate shall be signed:

   (1) In the case of a corporation, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility.
   (2) In the case of a partnership by a general partner.
   (3) In the case of sole proprietorship, by the proprietor, and
   (4) In the case of a municipal, state, federal or other governmental facility, by the principal executive officer, the ranking elected official, or other duly authorized employee.

   Under OAC rule 3745-31-04, this signature shall constitute personal affirmation that all statements or assertions of fact made in the application are true and complete, comply fully with applicable state requirements, and shall subject the signatory to liability under applicable state laws forbidding false or misleading statements.

____

Authorized Signature (for facility) Date

____

Print Name Title

Facility ID: _0448020102__________
Emissions Unit ID: __P001__________
Company Equipment ID: ___CTG #1______________

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☐ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) _______________ **OR** ☒ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _______________ and the date operation began (month/year) _______________

☒ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_P0110840____

When will you begin to modify the air contaminant source? (month/year) _______________ **OR** ☒ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

____

Identify modification date or the date modification began (month/year) _______________ and the date operation began (month/year) ________________

☐ Reconstruction of an existing air contaminant source/facility. Please explain: ________________________________

____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) ________________

☐ General Permit General Permit Category_________________ General Permit Type ________________

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: ____

2. **SCC Codes -** List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

__20100201____ ________________ ________________ ________________ ________________

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)	15.1	15.1	61.3	15.1	61.3
PM # 10 microns in diameter (PE/PM_{10})	15.1	15.1	61.3	15.1	61.3
PM # 2.5 microns in diameter (PE/$PM_{2.5}$)	15.1	15.1	61.3	15.1	61.3
Sulfur dioxide (SO_2)	4.7	4.7	18.8	4.7	18.8
Nitrogen oxides (NO_x)	295	23.6	92.0	23.6	92.0
Carbon monoxide (CO)	65	14.4	91.3	14.4	91.3
Organic compounds (OC)	10.6	5.9	38.5	5.9	38.5
Volatile organic compounds (VOC)	10.6	5.9	38.5	5.9	38.5
Lead (Pb)	0	0	0	0	0
Total Hazardous Air Pollutants (HAPs)	1.6	1.6	6.9	1.6	6.9
Highest single HAP: Toluene	0.4	0.4	1.5	0.4	1.5
Toxic Air Contaminants (see instructions):					
Toluene	0.4	0.4	1.5	0.4	1.5
Formaldehyde	0.3	0.3	1.4	0.3	1.4
Sulfuric Acid	1.6	1.6	6.6	1.6	6.6
Ammonia	21.8	21.8	86.7	21.8	86.7
Greenhouse Gas Pollutants	371,029	371,029	1,477,071	371,029	1,477,071

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT) -** For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection: ____No change to BACT controls established in Permit # P0110840______________

5. **Control Equipment -** Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.
Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations
PE/PM = Particulate emissions (formerly particulate matter)
PE/PM$_{10}$ = PM # 10 microns in diameter
PE/PM$_{2.5}$ = PM # 2.5 microns in diameter
OC = Organic compounds
VOC = Volatile organic compounds
SO_2 = Sulfur dioxide
NO_x = Nitrogen oxides
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: ____________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM$_{10}$ ☐ PE/PM$_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________
Design control efficiency (%): ____________ Basis for efficiency:________________
Operating control efficiency (%): ____________ Basis for efficiency:________________
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** ___________
Adsorption Media: ___________________________
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): __________________
Media replacement frequency or regeneration cycle time (specify units): _______________
Maximum temperature of the media bed, after regeneration (including any cooling cycle): __________
For Concentrator Only:
Design regeneration cycle time (minutes): _______________
Minimum desorption air stream temperature (°F): __________
Rotational rate (revolutions/hour): ______________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☒ Catalytic Converter
Manufacturer: ___TBD______________ Year installed: __2014___ **Your ID for control equipment** _Cat_Ox#1______
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM$_{10}$ ☐ PE/PM$_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☒ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): __100____ Basis for efficiency: Manufacturer Specifications
Design control efficiency (%): ___90_______ Basis for efficiency: Manufacturer Specifications
Operating control efficiency (%): ___90______ Basis for efficiency: Manufacturer Specifications
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☒ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: __HRSGSTK1_____________

☐ Catalytic Incinerator
Manufacturer: ____________________ Year installed: _________ **Your ID for control equipment** ________________

Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency: ________________
Design control efficiency (%): ____________ Basis for efficiency: ________________
Operating control efficiency (%): ____________ Basis for efficiency: ________________
Combustion chamber residence time (seconds): ____________
Minimum temperature difference (°F) across catalyst during air contaminant source operation: ___________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Minimum inlet gas temperature (°F): ___________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Condenser
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency: ________________
Design control efficiency (%): ____________ Basis for efficiency: ________________
Operating control efficiency (%): ____________ Basis for efficiency: ________________
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:** ___________________
Maximum exhaust gas temperature (°F) during air contaminant source operation: _______
Coolant type: _____________________
Design coolant temperature (°F): Minimum __________ Maximum _________
Design coolant flow rate (gpm): ________________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Cyclone/Multiclone
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency: ________________
Design control efficiency (%): ____________ Basis for efficiency: ________________
Operating control efficiency (%): ____________ Basis for efficiency: ________________
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____________
Operating pressure drop range (inches of water): Minimum: _________ Maximum: _________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Dry Scrubber
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency: ________________
Design control efficiency (%): ____________ Basis for efficiency: ________________
Operating control efficiency (%): ____________ Basis for efficiency: ________________

Reagent(s) used: Type: ______ **Injection rate(s):** ______
Inlet gas flow rate (acfm): ______ Outlet gas flow rate (acfm) : ______
Inlet gas temperature (°F): ______ Outlet gas temperature (°F): ______
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______
List all egress point IDs (from Table 7-A) associated with this control equipment: ______

☐ Electrostatic Precipitator
Manufacturer: ______ Year installed: ______ **Your ID for control equipment** ______
Describe this control equipment: ______
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ______
Design control efficiency (%): ______ Basis for efficiency: ______
Operating control efficiency (%): ______ Basis for efficiency: ______
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** ______
Number of operating fields: ______
Secondary voltage (V) range (minimum – maximum): ______
Secondary current (milliamps) range (minimum – maximum): ______
Inlet gas flow rate (acfm): ______ Outlet gas flow rate (acfm) : ______
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______
List all egress point IDs (from Table 7-A) associated with this control equipment: ______

☐ Fabric Filter/Baghouse
Manufacturer: ______ Year installed: ______ **Your ID for control equipment** ______
Describe this control equipment: ______
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ______
Design control efficiency (%): ______ Basis for efficiency: ______
Operating control efficiency (%): ______ Basis for efficiency: ______
Operating pressure drop range (inches of water): Minimum: ______ **Maximum:** ______
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other ______
Bag leak detection system: ☐ Yes ☐ No Type: ______
☐ **Lime injection or fabric coating agent used: Type:** ______ **Feed rate:** ______
Inlet gas flow rate (acfm): ______ Outlet gas flow rate (acfm) : ______
Inlet gas temperature (°F): ______ Outlet gas temperature (°F): ______
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______
List all egress point IDs (from Table 7-A) associated with this control equipment: ______

☐ Flare
Manufacturer: ______ Year installed: ______ **Your ID for control equipment** ______
Describe this control equipment: ______
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ______
Design control efficiency (%): ______ Basis for efficiency: ______
Operating control efficiency (%): ______ Basis for efficiency: ______
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): ______ Outlet gas flow rate (acfm) : ______

Inlet gas temperature (°F): ________ Outlet gas temperature (°F): ________

☐ **This is the only control equipment on this air contaminant source**

If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: ________

List all egress point IDs (from Table 7-A) associated with this control equipment: ________

☐ Fugitive Dust Suppression

Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** ________

Method of application: ________

Application rate (specify units): ________

Application frequency: ________

List all egress point IDs (from Table 7-B) associated with this control strategy: ________

☒ NOx Reduction Technology

Manufacturer: TBD Year installed: 2014 **Your ID for control equipment** SCR#1

Describe this control equipment: ________

Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☒ NO_x ☐ CO ☐ Pb ☐ Other ________

Estimated capture efficiency (%): 100 Basis for efficiency: Manufacturer Specifications

Design control efficiency (%): 90 Basis for efficiency: Manufacturer Specifications

Operating control efficiency (%): 90 Basis for efficiency: Manufacturer Specifications

NOx Reduction Type: ☒ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**

Inlet temp.: 600 **Outlet temp.:** 600

Inlet gas flow rate (acfm): 1,482,935

For Selective types only:

Reagent type: Ammonia (19%)

Reagent injection rate (specify units): 45 gallons per hour

Reagent slip (acfm): 5 ppmvd

☐ **This is the only control equipment on this air contaminant source**

If not, this control equipment is: ☒ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: ________

List all egress point IDs (from Table 7-A) associated with this control equipment: HRSGSTK1

☐ Passive Filter

Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** ________ **Your ID for filter** ________

Design control efficiency (%): ________ Basis for efficiency: ________

Change frequency: ________

Inlet gas flow rate (acfm): ________ Outlet gas flow rate (acfm) : ________

List all egress point IDs (from Table 7-A) associated with this control equipment: ________

☐ Settling Chamber

Manufacturer: ________ Year installed: ________ **Your ID for control equipment** ________

Describe this control equipment: ________

Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ________

Estimated capture efficiency (%): ________ Basis for efficiency: ________

Design control efficiency (%): ________ Basis for efficiency: ________

Operating control efficiency (%): ________ Basis for efficiency: ________

Length x Width x Height: ________

☐ **This is the only control equipment on this air contaminant source**

If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other air contaminant sources that are also vented to this control equipment: ________

List all egress point IDs (from Table 7-A) associated with this control equipment: ________

☐ Thermal Incinerator/Thermal Oxidizer

Manufacturer: ________ Year installed: ________ **Your ID for control equipment** ________

Describe this control equipment: ________

Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC ☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ________

Estimated capture efficiency (%): _________ Basis for efficiency:____________________
Design control efficiency (%): ____________ Basis for efficiency:____________________
Operating control efficiency (%): ____________ Basis for efficiency:____________________
Minimum operating temp. (°F) and sensor location: ______________________________ (See application instructions)
Combustion chamber residence time (seconds): ____________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: __________________________

☐ Wet Scrubber
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: _________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:____________________
Design control efficiency (%): ____________ Basis for efficiency:____________________
Operating control efficiency (%): ____________ Basis for efficiency:____________________
Operating pressure drop range (inches of water): Minimum: _________ **Maximum:** _________
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____________
pH range for scrubbing liquid: Minimum: _________ Maximum: _________
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): ____________________
Scrubber liquid supply pressure (psig): ______________ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: __________________________

☐ Other
Type: describe ____
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: _________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:____________________
Design control efficiency (%): ____________ Basis for efficiency:____________________
Operating control efficiency (%): ____________ Basis for efficiency:____________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: __________________________

6. **Process Flow Diagram -** Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
HRSGSTK1	**A**	**22 ft.**	**240**	**185**	**1,482,935**	**136.8**
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
Turbine Stack #1 (South)	**Round**	**380**	**590**	**84.1**	**82.4**	**302**

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100° F) (° F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
HRSGSTK1	41 deg 40 min 2.01 sec	-83 deg 26 min 36.78sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: ____

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☒ yes ☐ no

If yes, complete the following information.

Company Name or ID for the Egress Point __HRSGSTK1______________________

CEM Description__NOx & CO2 CEMS in accordance with 40CFR75, CO CEMS in accordance with 40 CFR 60__

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☒ CO ☒ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☒ CO_2 ☒ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

____3862____

Facility ID: _0448020102__________
Emissions Unit ID: __P002__________
Company Equipment ID: ___CTG #2______________

One copy of this section should be filled out for each air contaminant source (emissions unit) covered by this PTI/PTIO application identified in Section I, Question 5. See the application instructions for additional information.

1. **Air Contaminant Source Installation or Modification Schedule** – Check all that apply (must be completed regardless of date of installation or modification):

☐ New installation (for which construction has not yet begun, in accordance with OAC rule 3745-31-33). When will you begin to install the air contaminant source?

(month/year) _______________ **OR** ☒ after installation permit has been issued

☐ Initial application for an air contaminant source already installed or under construction. Identify installation date or the date construction began (month/year) _______________ and the date operation began (month/year) _______________

☒ Modification to an existing air contaminant source/facility (for which modification has not yet begun) - List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

_P0110840____

When will you begin to modify the air contaminant source? (month/year) _______________ **OR** ☒ after modification permit has been issued

☐ Modification application for an air contaminant source which has been or is currently being modified. List previous PTI or PTIO number(s) for air contaminant sources included in this application, if applicable, and describe the requested modification (attach an additional sheet, if necessary):

____

Identify modification date or the date modification began (month/year) _______________ and the date operation began (month/year) ________________

☐ Reconstruction of an existing air contaminant source/facility. Please explain: __________________________________

____

☐ Renewal of an existing permit-to-operate (PTO) or PTIO

Identify the date operation began after installation or latest modification (month/year) ________________

☐ General Permit General Permit Category_________________ General Permit Type ________________

Complete, sign and attach the appropriate Qualifying Criteria Document

☐ Other, please explain: ____

Facility ID: _0448020102__________
Emissions Unit ID: __P002__________
Company Equipment ID: ___CTG #2______________

2. **SCC Codes -** List all Source Classification Code(s) (SCC) that describe the process(es) performed by this air contaminant source (e.g., 1-02-002-04).

__20100201____ _________________ _________________ _________________ _________________

3. **Emissions Information** - The following table requests information needed to determine the applicable requirements and the compliance status of this air contaminant source with those requirements. Suggestions for how to estimate emissions may be found in the instructions to the Emissions Activity Category (EAC) forms required with this application. If you need further assistance, contact your District Office/Local Air Agency representative.
   - If total potential emissions of HAPs or any Toxic Air Contaminant (as identified in OAC rule 3745-114-01) are greater than 1 ton/yr, fill in the table for that (those) pollutant(s). For all other pollutants, if "Emissions before controls (max), lb/hr" multiplied by 24 hours/day is greater than 10 lbs/day, fill in the table for that pollutant.
   - Actual emissions are calculated including add-on control equipment. If you have no add-on control equipment, "Emissions before controls" will be the same as "Actual emissions".
   - Actual emissions and Requested Allowable should be based on operating 8760 hr/yr unless you are requesting federally enforceable operating restrictions to limit emissions. If so, calculate emissions based on requested operating restrictions and describe in your calculations.
   - If you use units other than lbs/hr or ton/yr, specify the units used (e.g., gr/dscf, lb/ton charged, lb/MMBtu, tons/12-months).
   - Requested Allowable (ton/yr) is often equivalent to Potential to Emit (PTE) as defined in OAC rule 3745-31-01 and OAC rule 3745-77-01.

Pollutant	Emissions before controls (max)* (lb/hr)	Actual emissions* (lb/hr)	Actual emissions* (ton/year)	Requested Allowable* (lb/hr)	Requested Allowable* (ton/year)
Particulate emissions (PE/PM) (formerly particulate matter, PM)	15.1	15.1	61.3	15.1	61.3
PM # 10 microns in diameter (PE/PM_{10})	15.1	15.1	61.3	15.1	61.3
PM # 2.5 microns in diameter (PE/$PM_{2.5}$)	15.1	15.1	61.3	15.1	61.3
Sulfur dioxide (SO_2)	4.7	4.7	18.8	4.7	18.8
Nitrogen oxides (NO_x)	295	23.6	92.0	23.6	92.0
Carbon monoxide (CO)	65	14.4	91.3	14.4	91.3
Organic compounds (OC)	10.6	5.9	38.5	5.9	38.5
Volatile organic compounds (VOC)	10.6	5.9	38.5	5.9	38.5
Lead (Pb)	0	0	0	0	0
Total Hazardous Air Pollutants (HAPs)	1.6	1.6	6.9	1.6	6.9
Highest single HAP: Toluene	0.4	0.4	1.5	0.4	1.5
Toxic Air Contaminants (see instructions):					
Toluene	0.4	0.4	1.5	0.4	1.5
Formaldehyde	0.3	0.3	1.4	0.3	1.4
Sulfuric Acid	1.6	1.6	6.6	1.6	6.6
Ammonia	21.8	21.8	86.7	21.8	86.7
Greenhouse Gas Pollutants	371,029	371,029	1,477,071	371,029	1,477,071

* Provide your calculations as an attachment and explain how all process variables and emission factors were selected. Note the emission factor(s) employed and document origin. Example: AP-42, Table 4.4-3 (8/97); stack test, Method 5, 4/96; mass balance based on MSDS; etc.

4. **Best Available Technology (BAT) -** For each pollutant for which the Requested Allowable in the above table exceeds 10 tons per year, BAT, as defined in OAC 3745-31-01, is required. Describe what has been selected as BAT and the basis for the selection: ____No change to BACT controls established in Permit # P0110840_______________

5. **Control Equipment -** Does this air contaminant source employ emissions control equipment?

☒ Yes - fill out the applicable information below.
☐ No - proceed to Question 6.
Select the type(s) of control equipment employed below (required data for selected control equipment in **bold**):

Pollutant abbreviations
PE/PM = Particulate emissions (formerly particulate matter)
PE/PM_{10} = PM # 10 microns in diameter
PE/$PM_{2.5}$ = PM # 2.5 microns in diameter
OC = Organic compounds
VOC = Volatile organic compounds
SO_2 = Sulfur dioxide
NO_x = Nitrogen oxides
CO = Carbon monoxide
Pb = Lead

☐ Adsorber
Manufacturer: ____________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ___________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ PE/$PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:_______________________________________
Design control efficiency (%): ____________ Basis for efficiency:_______________________________________
Operating control efficiency (%): ____________ Basis for efficiency:_______________________________________
Type: ☐ **Fluidized Bed** ☐ **Fixed Bed** ☐ **Moving Bed** ☐ **Disposable** ☐ **Concentrator** ☐ **Other** ___________
Adsorption Media: ____________________________
For Fluidized Bed, Fixed Bed, Moving Bed and Disposable only:
Maximum design outlet organic compound concentration (ppmv): __________________
Media replacement frequency or regeneration cycle time (specify units): ________________
Maximum temperature of the media bed, after regeneration (including any cooling cycle): __________
For Concentrator Only:
Design regeneration cycle time (minutes): _______________
Minimum desorption air stream temperature (°F): __________
Rotational rate (revolutions/hour): ______________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☒ Catalytic Converter
Manufacturer: ___TBD______________ Year installed: __2014___ **Your ID for control equipment** _Cat_Ox#2______
Describe this control equipment: ___________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ PE/$PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☒ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): __100____ Basis for efficiency: Manufacturer Specifications________________
Design control efficiency (%): ___90______ Basis for efficiency: Manufacturer Specifications________________
Operating control efficiency (%): ___90_____ Basis for efficiency: Manufacturer Specifications_______________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☒ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: __HRSGSTK1_____________

☐ Catalytic Incinerator
Manufacturer: ____________________ Year installed: _________ **Your ID for control equipment** ________________

Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________
Design control efficiency (%): ____________ Basis for efficiency:________________
Operating control efficiency (%): ____________ Basis for efficiency:________________
Combustion chamber residence time (seconds): ____________
Minimum temperature difference (°F) across catalyst during air contaminant source operation: ___________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Minimum inlet gas temperature (°F): ___________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☐ Condenser
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________
Design control efficiency (%): ____________ Basis for efficiency:________________
Operating control efficiency (%): ____________ Basis for efficiency:________________
Type: ☐ **Indirect contact** ☐ **Direct contact** ☐ **Freeboard refrigeration device** ☐ **Other:**__________________
Maximum exhaust gas temperature (°F) during air contaminant source operation: _______
Coolant type: _____________________
Design coolant temperature (°F): Minimum __________ Maximum _________
Design coolant flow rate (gpm): _________________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☐ Cyclone/Multiclone
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________
Design control efficiency (%): ____________ Basis for efficiency:________________
Operating control efficiency (%): ____________ Basis for efficiency:________________
Type: ☐ **Simple** ☐ **Multiclone** ☐ **Rotoclone** ☐ **Other** _____________
Operating pressure drop range (inches of water): Minimum: _________ Maximum: _________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☐ Dry Scrubber
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________
Design control efficiency (%): ____________ Basis for efficiency:________________
Operating control efficiency (%): ____________ Basis for efficiency:________________

Reagent(s) used: Type: ____________ **Injection rate(s):** ____________
Inlet gas flow rate (acfm): ________ Outlet gas flow rate (acfm) : ________
Inlet gas temperature (°F): ________ Outlet gas temperature (°F): ________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________

☐ Electrostatic Precipitator
Manufacturer: ________ Year installed: ______ **Your ID for control equipment** ________
Describe this control equipment: ____________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ____________
Design control efficiency (%): ______ Basis for efficiency: ____________
Operating control efficiency (%): ______ Basis for efficiency: ____________
Type: ☐ **Dry** ☐ **Wet** ☐ **Other:** ______
Number of operating fields: ______
Secondary voltage (V) range (minimum – maximum): ____________
Secondary current (milliamps) range (minimum – maximum): ____________
Inlet gas flow rate (acfm): ________ Outlet gas flow rate (acfm) : ________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________

☐ Fabric Filter/Baghouse
Manufacturer: ________ Year installed: ______ **Your ID for control equipment** ________
Describe this control equipment: ____________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ____________
Design control efficiency (%): ______ Basis for efficiency: ____________
Operating control efficiency (%): ______ Basis for efficiency: ____________
Operating pressure drop range (inches of water): Minimum: ______ **Maximum:** ______
Pressure type: ☐ **Negative pressure** ☐ **Positive pressure**
Fabric cleaning mechanism: ☐ Reverse air ☐ Pulse jet ☐ Shaker ☐ Other ______
Bag leak detection system: ☐ Yes ☐ No Type: ____________
☐ **Lime injection or fabric coating agent used: Type:** ______ **Feed rate:** ______
Inlet gas flow rate (acfm): ________ Outlet gas flow rate (acfm) : ________
Inlet gas temperature (°F): ________ Outlet gas temperature (°F): ________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________

☐ Flare
Manufacturer: ________ Year installed: ______ **Your ID for control equipment** ________
Describe this control equipment: ____________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other ______
Estimated capture efficiency (%): ______ Basis for efficiency: ____________
Design control efficiency (%): ______ Basis for efficiency: ____________
Operating control efficiency (%): ______ Basis for efficiency: ____________
Type: ☐ **Enclosed** ☐ **Elevated (open)**
If Elevated (open): ☐ **Air-assisted** ☐ **Steam-assisted** ☐ **Non-assisted**
Ignition device: ☐ **Electric arc** ☐ **Pilot flame**
Flame presence sensor: ☐ **Yes** ☐ **No**
Inlet gas flow rate (acfm): ________ Outlet gas flow rate (acfm) : ________

Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Fugitive Dust Suppression
Suppressant Type: ☐ **Water** ☐ **Chemical** ☐ **Calcium chloride** ☐ **Asphaltic cement** ☐ **Other** ___________
Method of application: ____
Application rate (specify units): ____
Application frequency: ____
List all egress point IDs (from Table 7-B) associated with this control strategy: ____________________________

☒ NOx Reduction Technology
Manufacturer: ___TBD_____________ Year installed: __2014_ __ **Your ID for control equipment** __SCR#2________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☒ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): __100____ Basis for efficiency: Manufacturer Specifications
Design control efficiency (%): ___90_______ Basis for efficiency: Manufacturer Specifications
Operating control efficiency (%): ___90_____ Basis for efficiency: Manufacturer Specifications
NOx Reduction Type: ☒ **Selective Catalytic** ☐ **Non-Selective Catalytic** ☐ **Selective Non-Catalytic**
Inlet temp.: ___600_________ **Outlet temp.:** __600
Inlet gas flow rate (acfm): __1,482,935__________________
For Selective types only:
Reagent type: __Ammonia (19%)____________________________________
Reagent injection rate (specify units): __45 gallons per hour______________________
Reagent slip (acfm): ___5 ppmvd________________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☒ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: _HRSGSTK1______________

☐ Passive Filter
Type: ☐ **Bin vent** ☐ **Paint booth filter** ☐ **Filter sock** ☐ **Other:** _____________ **Your ID for filter** ___________
Design control efficiency (%): ____________ Basis for efficiency: ____
Change frequency: ____________________________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Settling Chamber
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** _______________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:________________________________
Design control efficiency (%): ____________ Basis for efficiency:________________________________
Operating control efficiency (%): ____________ Basis for efficiency:________________________________
Length x Width x Height: ________________________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ____________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ____________________________

☐ Thermal Incinerator/Thermal Oxidizer
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** _______________
Describe this control equipment: ________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________

Estimated capture efficiency (%): _________ Basis for efficiency:______________________
Design control efficiency (%): ____________ Basis for efficiency:______________________
Operating control efficiency (%): ____________ Basis for efficiency:______________________
Minimum operating temp. (°F) and sensor location: ________________________________ (See application instructions)
Combustion chamber residence time (seconds): ____________
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☐ Wet Scrubber
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: _________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:______________________
Design control efficiency (%): ____________ Basis for efficiency:______________________
Operating control efficiency (%): ____________ Basis for efficiency:______________________
Operating pressure drop range (inches of water): Minimum: _________ **Maximum:** _________
Type: ☐ **Impingement** ☐ **Packed bed** ☐ **Spray chamber** ☐ **Venturi** ☐ **Other:** _____________
pH range for scrubbing liquid: Minimum: _________ Maximum: _________
Is scrubber liquid recirculated? ☐ Yes ☐ No
Scrubber liquid flow rate (gal/min): ____________________
Scrubber liquid supply pressure (psig): ______________ NOTE: This item for spray chambers only.
Inlet gas flow rate (acfm): ________________ Outlet gas flow rate (acfm) : ________________
Inlet gas temperature (°F): ________________ Outlet gas temperature (°F): ________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

☐ Other
Type: describe ____
Manufacturer: ___________________ Year installed: _________ **Your ID for control equipment** ________________
Describe this control equipment: _________________________________
Pollutant(s) controlled: ☐ PE/PM ☐ PE/PM_{10} ☐ $PE/PM_{2.5}$ ☐ OC ☐ VOC
☐ SO_2 ☐ NO_x ☐ CO ☐ Pb ☐ Other _____________
Estimated capture efficiency (%): _________ Basis for efficiency:______________________
Design control efficiency (%): ____________ Basis for efficiency:______________________
Operating control efficiency (%): ____________ Basis for efficiency:______________________
☐ **This is the only control equipment on this air contaminant source**
If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel
List all other air contaminant sources that are also vented to this control equipment: ______________________________
List all egress point IDs (from Table 7-A) associated with this control equipment: ___________________________

6. **Process Flow Diagram -** Attach a Process Flow Diagram to this application for this air contaminant source. See the application instructions for additional information.

7. **Modeling information: (Note: items in bold in Tables 7-A and/or 7-B, as applicable, are required even if the tables do not otherwise need to be completed. If applicable, all information is required.)** An air quality modeling analysis is required for PTIs and PTIOs for new installations or modifications, as defined in OAC rule 3745-31-01, where either the increase of toxic air contaminants from any air contaminant source or the increase of any other pollutant for all air contaminant sources combined exceed a threshold listed below. This analysis is to assure that the impact from the requested project will not exceed Ohio's Acceptable Incremental Impacts for criteria pollutants and/or Maximum Allowable Ground Level Concentrations (MAGLC) for toxic air contaminants. (See Ohio EPA, DAPC's Engineering Guide #69 for more information.) Permit requests that would have unacceptable impacts cannot be approved as proposed. See the line-by-line PTI/PTIO instructions for additional information.

Complete Tables 7-A and 7-C for stack emissions egress points and/or Table 7-B and 7-C for fugitive emissions egress points below if the requested allowable annual emission rate for this PTI or PTIO exceeds any of the following:

- Particulate Emissions (PE/PM_{10}): 10 tons per year
- Sulfur Dioxide (SO2): 25 tons per year
- Nitrogen Oxides (NOx): 25 tons per year
- Carbon Monoxide (CO): 100 tons per year
- Lead (Pb): 0.6 ton per year
- Toxic Air Contaminants: 1 ton per year. Toxic air contaminants are identified in OAC rule 3745-114-01.

Complete Table 7-A below for each stack emissions egress point. An egress point is a point at which emissions from an air contaminant source are released into the ambient (outside) air. List each individual egress point on a separate pair of lines. In each case, use the dimensions of the tallest nearby (or attached) building, building segment or structure.

Table 7-A, Stack Egress Point Information

❶ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
HRSGSTK1	**A**	**22 ft.**	**240**	**185**	**1,482,935**	**136.8**
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)
Turbine Stack #1 (South)	**Round**	**380**	**590**	**84.1**	**82.4**	**302**

❷ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

❸ Company ID for the Egress Point	Type Code*	Dimensions or Diameter	Height from the Ground (ft)	Temp. at Max. Operation (F)	Flow Rate at Max. Operation (ACFM)	Minimum Distance to Fence Line (ft)
Company Description for the Egress Point	Shape: round, square, rectangular	Cross Sectional Area	Base Elevation (ft)	Building Height (ft)	Building Width (ft)	Building Length (ft)

*Type codes for stack egress points:

A. vertical stack (unobstructed): There are no obstructions to upward flow in or on the stack such as a rain cap.
B. vertical stack (obstructed): There are obstructions to the upward flow, such as a rain cap, which prevents or inhibits the air flow in a vertical direction.
C. non-vertical stack: The stack directs the air flow in a direction which is not directly upward.

Facility ID: _0448020102__________
Emissions Unit ID: __P002__________
Company Equipment ID: ___CTG #2______________

Complete Table 7-B below for each fugitive emissions egress point. List each individual egress point on a separate line. Refer to the description of the fugitive egress point types below the table for use in completing the type column of the table. For an air contaminant source with multiple fugitive emissions egress points, include only the primary egress points.

Table 7-B, Fugitive Egress Point Information

❶ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100^o F) (^{o} F)	Minimum Distance to the Fence Line (ft)

❷ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100^o F) (^{o} F)	Minimum Distance to the Fence Line (ft)

❸ **Company ID or Name for the Egress Point**	Type* (check one) ☐ Area ☐ Volume	Area Source Dimensions (Length x Width, in feet)	Volume Source Dimensions (Height x Width, in feet)
Company Description for the Egress Point	Release Height (ft)	Exit Gas Temp. (only if in excess of 100^o F) (^{o} F)	Minimum Distance to the Fence Line (ft)

*Types for fugitive egress point:

Area: an open fugitive source characterized as a horizontal area (L x W) with a release height. For irregular surfaces such as storage piles, enter dimensions of an average cross section; release height is entered as half of the maximum pile height. For process sources such as crushers, use the process opening (e.g., area of crusher hopper opening) and ignore material handling and storage emissions points.

Volume: an unpowered vertical opening, such as a window or roof monitor, characterized as a vertical area (W x H) with a release height, measured at the midpoint of the opening. Multiple openings in a building may be averaged, if necessary.

Use the same Company Name or ID for the Egress Point in Table 7-C that was used in Table 7-A or 7-B. See the line-by-line PTI/PTIO instructions for additional information.

Table 7-C, Egress Point Location

Company Name or ID for the Egress Point (as identified above)	Egress Point Latitude	Egress Point Longitude
HRSGSTK1	41 deg 40 min 3.42 sec	-83 deg 26 min 36.86sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec
	deg min sec	deg min sec

8. Request for Enforceable Restrictions - As part of this permit application, do you wish to propose voluntary restrictions to limit emissions in order to avoid specific requirements listed below, (i.e., are you requesting state-only enforceable limits or state and federally enforceable limits to obtain synthetic minor status)?

☐ yes
☒ no
☐ not sure - please contact me to discuss whether this affects the facility.

If yes, why are you requesting enforceable restrictions? Check all that apply.

☐ a. to avoid being a major Title V source (see OAC rule 3745-77-01 and OAC rule 3745-31)
☐ b. to avoid being a major MACT source (see OAC rule 3745-31-01)
☐ c. to avoid being a major stationary source (see OAC rule 3745-31-01)
☐ d. to avoid being a major modification (see OAC rule 3745-31-01)
☐ e. to avoid an air dispersion modeling requirement (see Engineering Guide # 69)
☐ f. to avoid BAT requirements (see OAC rule 3745-31-05(A)(3)(b))
☐ g. to avoid another requirement. Describe: ______________________________

If you checked a., b. or c., please attach a facility-wide potential to emit (PTE) analysis (for each pollutant) and synthetic minor strategy to this application. (See application instructions for definition of PTE.) If you checked d., please attach a net emission change analysis to this application. If you checked e., f. or g., please attach a description of the restrictions proposed and how compliance with those restrictions will be verified.

9. Continuous Emissions Monitoring – Does this air contaminant source utilize any continuous emissions monitoring (CEM) equipment for indicating or demonstrating compliance? This does not include continuous parametric monitoring systems.

☒ yes ☐ no

If yes, complete the following information.

Company Name or ID for the Egress Point __HRSGSTK2______________________

CEM Description__NOx & CO2 CEMS in accordance with 40CFR75, CO CEMS in accordance with 40 CFR 60__

This CEM monitors (check all that apply):

☐ Opacity ☐ Flow ☒ CO ☒ NOx ☐ SO_2 ☐ THC ☐ HCl ☐ HF ☐ H_2S ☐ TRS ☒ CO_2 ☒ O_2 ☐ PM

10. **EAC Forms** - The appropriate Emissions Activity Category (EAC) form(s) must be completed and attached for each air contaminant source unless a general permit is being requested. At least one complete EAC form must be submitted for each air contaminant source for the application to be considered complete. Refer to the list attached to the application instructions. Please indicate which EAC form corresponds to this air contaminant source.

____3862____

FOR OHIO EPA USE
FACILITY ID: ________________
EU ID: _______ PTI#:__________

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☐ New Permit ☒ Renewal or Modification of Air Permit Number (e.g. P001)_P0110840-P001

2. Maximum Operating Schedule: __8,760_____ hours per day; _365____ days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. ______________________________________

3. Engine type: ☒ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☐ Driving pump or compressor ☒ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☒ Non-emergency

6. Engine Manufacturer: ___Siemens______________ Model No: ___SCC6-8000H___________

7. Engine exhaust configuration: (for turbines only)
   - ☐ simple cycle *(no heat recovery)*
   - ☐ regenerative cycle *(heat recovery to preheat combustion air)*
   - ☐ cogeneration cycle *(heat recovered to produce steam)*
   - ☒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated ________ Maximum _2,936___ Normal _______

Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

Rated:_________ Maximum ___300__ Normal ___________

9. Output capacities (Horsepower): Rated: _________ Maximum ___________ Normal ___________

(Kilowatts): Rated: _273,800 @ ISO Maximum 313,350 Normal ___________

(lbs steam/hr)*: Rated: ___________ Maximum ________ Normal ___________

**required for cogeneration or combined cycle units only*

10. Type of ignition: ☐ non-spark (diesel) ☐ spark

11. Type of fuel fired (check all that apply):

☒ single fuel
☐ dual fuel
☐ No. 2 oil, low-sulfur
☐ No. 2 oil, high-sulfur
☐ gasoline
☐ other, explain ______________________________
☒ natural gas
☐ diesel
☐ landfill gas
☐ digester gas
☐ propane

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	Heat Content (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage: Estimated Maximum Per Year	Fuel Usage: Normal Per Hour	Fuel Usage: Max. Per Hour
Nat. gas[1]	1,028 BTU/cu ft		0.005 gr/scf	22,154 MMcu ft	cu ft	2.86 MMcu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						
Nat Gas[1]	1028 BTU/cu ft		0.005gr/scf	2,088 MMcu ft		0.28 MMcu ft

[1] Natural gas heat content from 40 CFR 98, Subpart C.

13. Type of combustion cycle (check all that apply):

☐ 2-stroke
☐ rich-burn
☐ carbureted
☐ other, explain ______________________________
☐ 4-stroke
☐ lean-burn
☐ fuel injected

14. Emissions control techniques (check all that apply):

☐ prestratified charge
☒ catalytic oxidation (CO)
☐ air/fuel ratio
☐ 2-stage rich/lean combustion
☐ water/steam injection
☐ other, explain______________________________
☐ nonselective catalytic reduction (NSCR)
☒ selective catalytic reduction (SCR)
☐ injection timing retard (ITR)
☐ 2-stage lean/lean combustion
☐ preignition chamber combustion (PCC)

For each emissions control technique checked above, explain what pollutants are controlled by each technique:

Catalytic oxidation will control VOCs and CO. Selective Catalytic Reduction (SCR) will control NOx

FOR OHIO EPA USE
FACILITY ID: ________________
EU ID: _______ PTI#:__________

EMISSIONS ACTIVITY CATEGORY FORM
STATIONARY INTERNAL COMBUSTION ENGINE

This form is to be completed for each stationary reciprocating or gas turbine engine. State/Federal regulations which may apply to stationary internal combustion engines are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

☐ New Permit ☒ Renewal or Modification of Air Permit Number (e.g. P001) P0110840-P002

2. Maximum Operating Schedule: 8,760 hours per day; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. ______________________

3. Engine type: ☒ Gas turbine ☐ Reciprocating

4. Purpose of engine: ☐ Driving pump or compressor ☒ Driving electrical generator

5. Normal use of engine: ☐ Emergency only ☒ Non-emergency

6. Engine Manufacturer: Siemens Model No: SCC6-8000H

7. Engine exhaust configuration: (for turbines only)
☐ simple cycle *(no heat recovery)*
☐ regenerative cycle *(heat recovery to preheat combustion air)*
☐ cogeneration cycle *(heat recovered to produce steam)*
☒ combined cycle *(heat recovered to produce steam which drives generator)*

8. Input capacities (million BTU/hr): Rated ________ Maximum 2,936 Normal _______

Supplemental burner (duct burner) input capacity, if equipped (million BTU/hr):

Rated:_________ Maximum 300 Normal ___________

9. Output capacities (Horsepower): Rated: _________ Maximum ___________ Normal ___________

(Kilowatts): Rated: 273,800 @ ISO Maximum 313,350 Normal ___________

(lbs steam/hr)*: Rated: ___________ Maximum ________ Normal ___________ *required for cogeneration or combined cycle units only

10. Type of ignition: ☐ non-spark (diesel) ☐ spark

11. Type of fuel fired (check all that apply):

☒ single fuel
☐ dual fuel
☐ No. 2 oil, low-sulfur
☐ No. 2 oil, high-sulfur
☐ gasoline
☐ other, explain ______
☒ natural gas
☐ diesel
☐ landfill gas
☐ digester gas
☐ propane

12. Complete the following table for all fuels identified in question 11 that are used for the engine and any supplemental (duct) burners, if equipped:

Fuel	Heat Content (BTU/unit)	wt.% Ash	wt.% Sulfur	Fuel Usage Estimated Maximum Per Year	Normal Per Hour	Max. Per Hour
Nat. gas[1]	1,028 BTU/cu ft		0.005 gr/scf	22,154 MMcu ft	cu ft	2.86 MMcu ft
No. 2 oil	BTU/gal			gal	gal	gal
Gasoline	BTU/gal			gal	gal	gal
Diesel	BTU/gal			gal	gal	gal
Landfill/digester gas	BTU/cu ft		ppm	cu ft	cu ft	cu ft
Other (show units)						
List supplemental (duct) burner fuel and information below (show units):						
Nat Gas[1]	1028 BTU/cu ft		0.005gr/scf	2,088 MMcu ft		0.28 MMcu ft

[1] Natural gas heat content from 40 CFR 98, Subpart C.

13. Type of combustion cycle (check all that apply):

☐ 2-stroke
☐ rich-burn
☐ carbureted
☐ other, explain ______
☐ 4-stroke
☐ lean-burn
☐ fuel injected

14. Emissions control techniques (check all that apply):

☐ prestratified charge
☒ catalytic oxidation (CO)
☐ air/fuel ratio
☐ 2-stage rich/lean combustion
☐ water/steam injection
☐ other, explain______
☐ nonselective catalytic reduction (NSCR)
☒ selective catalytic reduction (SCR)
☐ injection timing retard (ITR)
☐ 2-stage lean/lean combustion
☐ preignition chamber combustion (PCC)

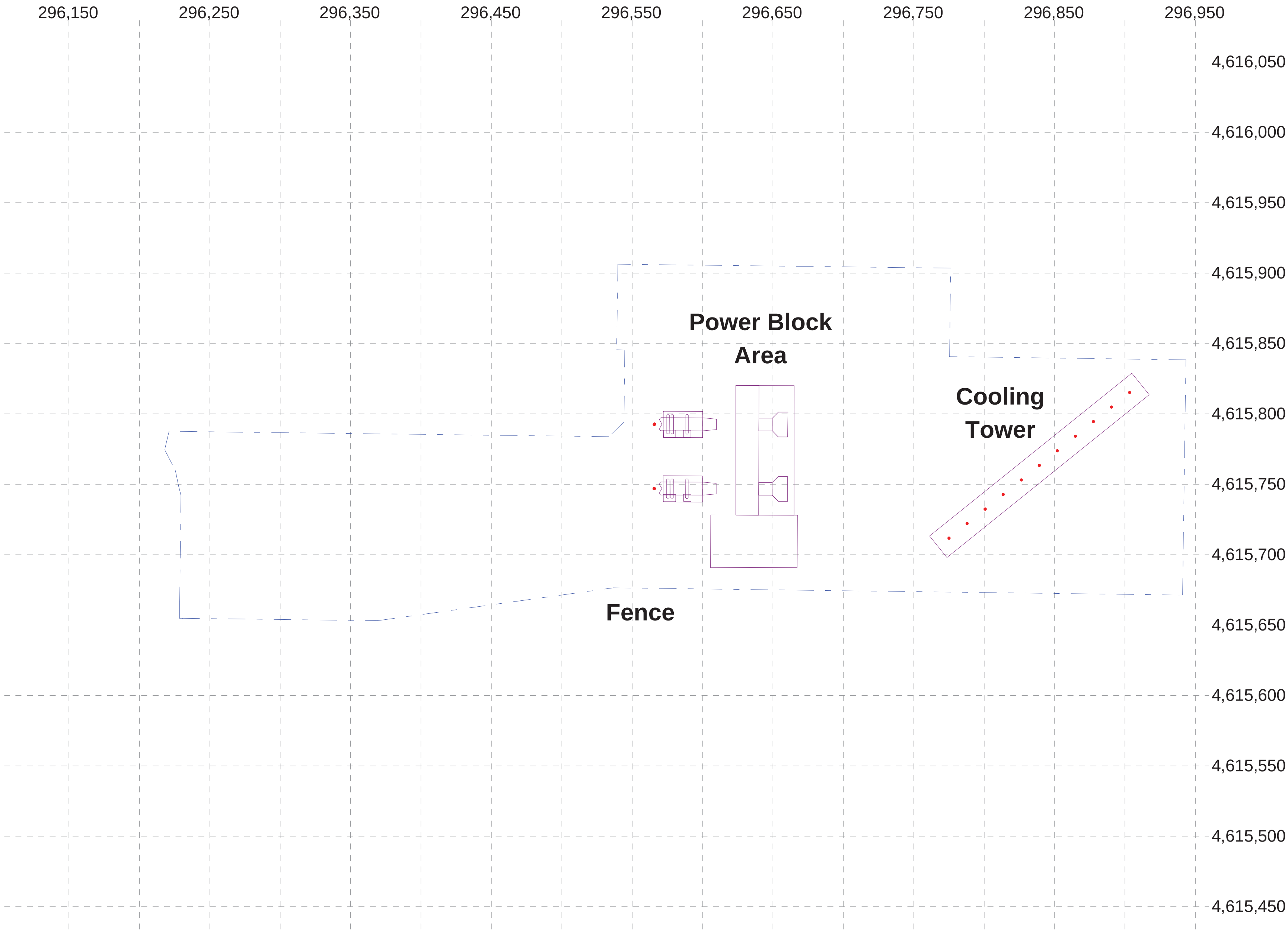
For each emissions control technique checked above, explain what pollutants are controlled by each technique:

Catalytic oxidation will control VOCs and CO. Selective Catalytic Reduction (SCR) will control NOx

ATTACHMENT D

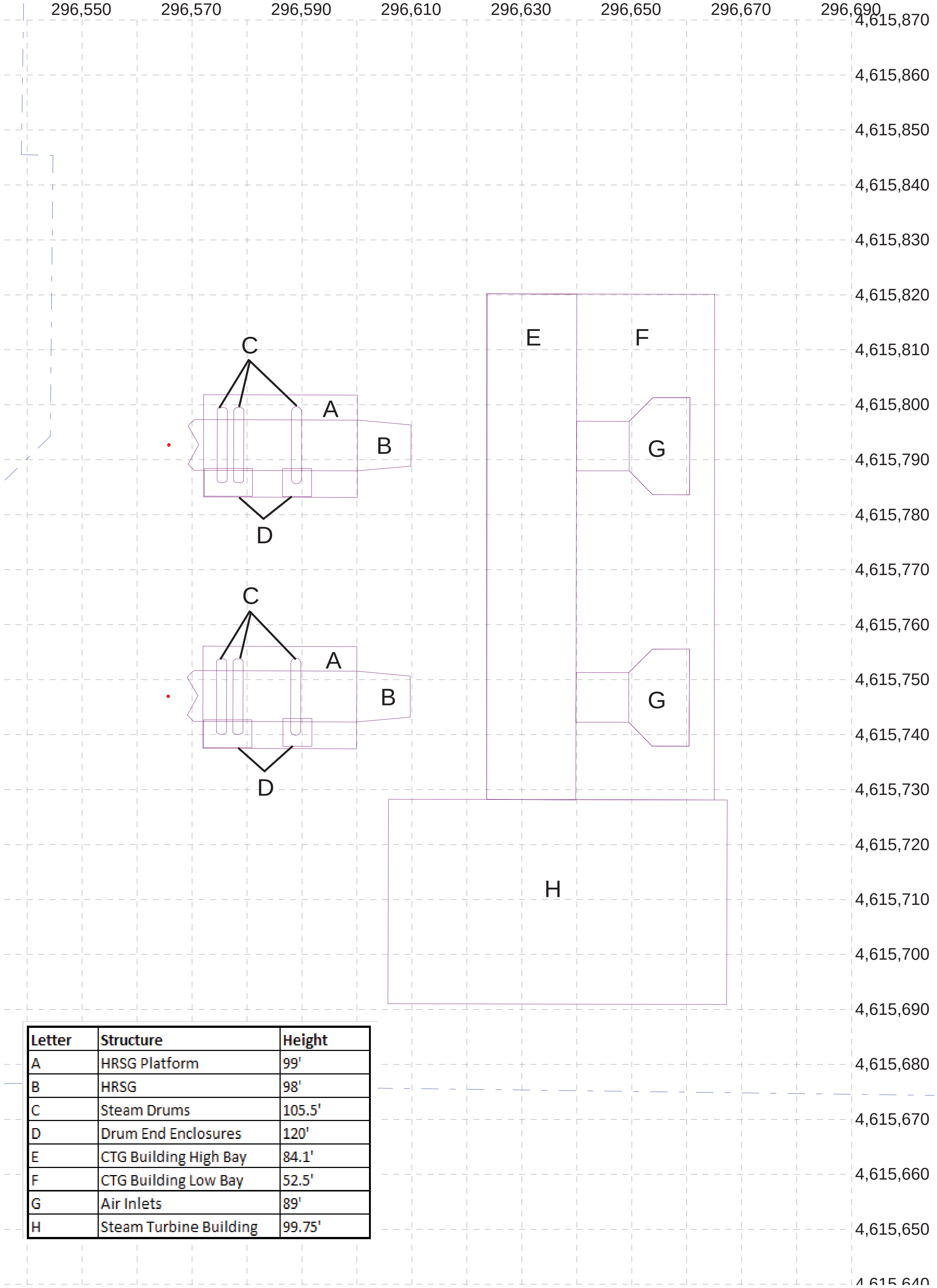
Modeling Analysis Supporting Data

OCEC - Facility Layout Schematic Diagram



Scale: 1" = 101.5 Meters

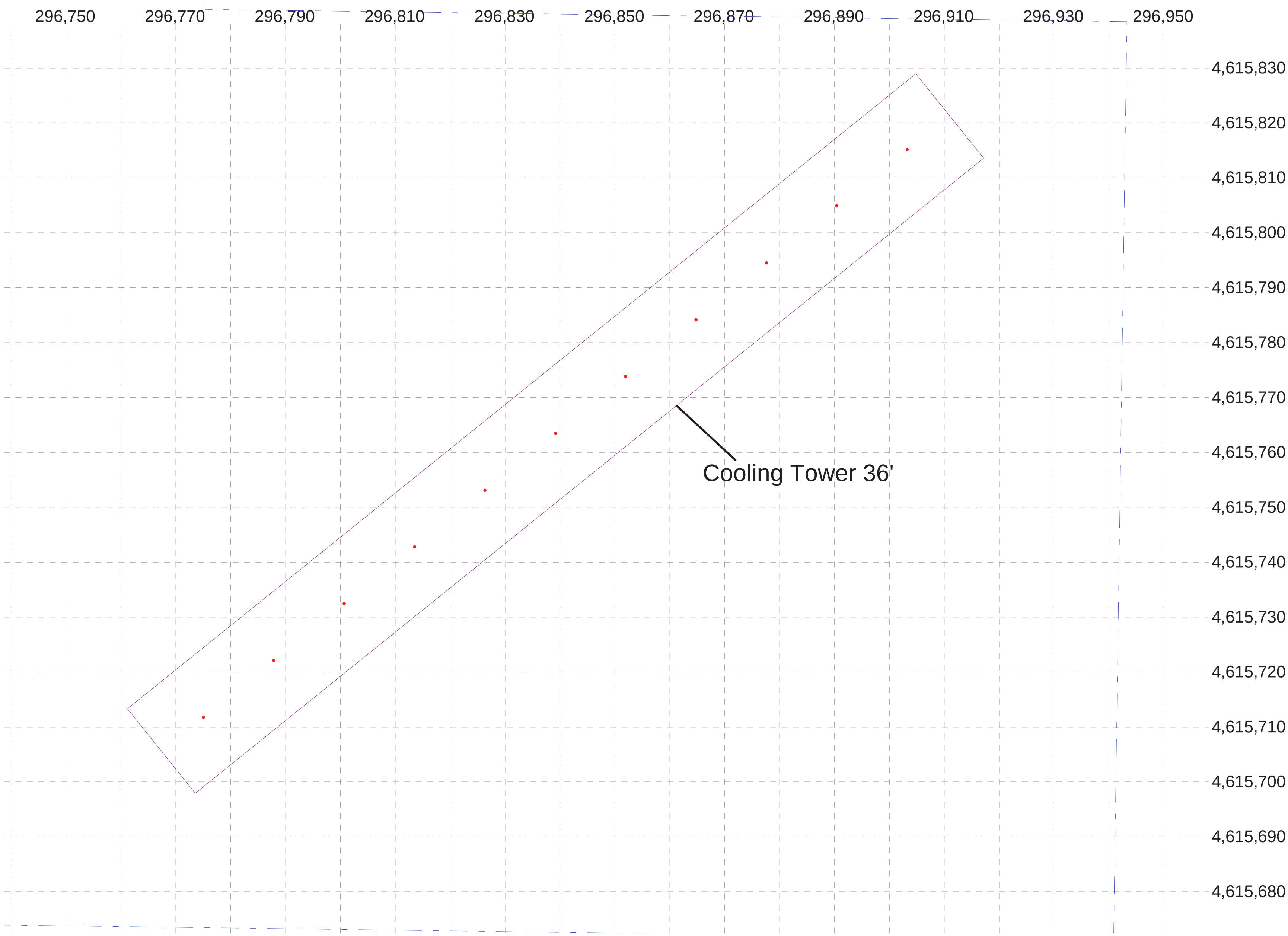
OCEC - Facility Layout Schematic Diagram - Main Turbine Block



Letter	Structure	Height
A	HRSG Platform	99'
B	HRSG	98'
C	Steam Drums	105.5'
D	Drum End Enclosures	120'
E	CTG Building High Bay	84.1'
F	CTG Building Low Bay	52.5'
G	Air Inlets	89'
H	Steam Turbine Building	99.75'

Scale: 1" = 26.0 Meters

OCEC - Facility Layout Schematic Diagram - Cooling Tower



Scale: 1" = 26.0 Meters

OCEC - Detailed AERMOD Results Summary for Range of Normal Conditions

Parameter	Units		Selected Design Cases											
		Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7
NO_x	g/s	2.97	2.76	2.18	1.86	2.70	2.46	1.92	1.64	2.49	2.18	2.00	1.63	1.40
CO	g/s	1.81	1.64	1.32	1.13	1.64	1.50	1.17	1.01	1.52	1.34	1.22	1.00	0.86
$PM_{10}/PM_{2.5}$	g/s	1.90	1.68	1.29	1.01	1.76	1.50	1.18	1.06	1.73	1.31	1.25	1.07	1.01
SO_2	g/s	0.59	0.55	0.44	0.38	0.54	0.49	0.39	0.33	0.50	0.44	0.40	0.33	0.29
H_2SO_4	g/s	0.19	0.20	0.16	0.14	0.19	0.18	0.14	0.13	0.18	0.16	0.15	0.13	0.10
NH_3	g/s	2.75	2.56	2.02	1.73	2.49	2.27	1.78	1.52	2.31	2.03	1.85	1.50	1.30
Formaldehyde	g/s	0.043	0.041	0.033	0.028	0.039	0.037	0.029	0.025	0.036	0.033	0.030	0.024	0.021
Toluene	g/s	0.048	0.048	0.038	0.032	0.043	0.043	0.033	0.029	0.038	0.038	0.035	0.028	0.024
Xylene	g/s	0.024	0.024	0.019	0.016	0.021	0.021	0.016	0.014	0.019	0.019	0.017	0.014	0.012

AERMOD Results for 2 turbines at Unit (1 g/s) Emissions , ug/m3 (Max H1H across 5 years)

	Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7
Annua	0.024	0.024	0.033	0.038	0.026	0.025	0.035	0.040	0.030	0.028	0.032	0.037	0.042
1-hou	2.171	2.180	2.553	2.711	2.293	2.232	2.621	2.803	2.443	2.368	2.525	2.678	2.911
3-hou	0.979	0.983	1.358	1.507	1.075	1.029	1.420	1.563	1.254	1.154	1.359	1.475	1.613
8-hou	0.875	0.879	1.130	1.281	0.946	0.921	1.191	1.358	1.051	1.016	1.113	1.264	1.396
24-hou	0.474	0.476	0.622	0.724	0.511	0.491	0.679	0.760	0.572	0.549	0.609	0.705	0.785
H2H 24-hou	0.340	0.342	0.462	0.529	0.375	0.359	0.488	0.569	0.418	0.395	0.455	0.512	0.582

AERMOD Results 2 Turbines Only - Scaled Pollutant impacts, ug/m3 - (Max H1H across 5 years)

	Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7	Max	SIL
Annual NO2	0.072	0.067	0.071	0.071	0.071	0.062	0.067	0.066	0.074	0.061	0.064	0.060	0.059	**0.07**	**1**
1-hour NO2	6.46	6.01	5.56	5.05	6.18	5.48	5.02	4.59	6.10	5.16	5.06	4.35	4.07	**6.46**	**7.8**
1-hour CO	3.94	3.57	3.38	3.07	3.76	3.35	3.07	2.83	3.72	3.16	3.09	2.67	2.49	**3.94**	**2000**
8-hour CO	1.59	1.44	1.49	1.45	1.55	1.38	1.40	1.37	1.60	1.36	1.36	1.26	1.20	**1.60**	**500**
24-hr PM	0.90	0.80	0.80	0.73	0.90	0.74	0.80	0.80	0.99	0.72	0.76	0.76	0.79	**0.99**	**1.2**
24-hr PM (H2H)	0.65	0.57	0.59	0.53	0.66	0.54	0.58	0.60	0.72	0.52	0.57	0.55	0.59	**0.72**	**1.2**
Annual PM	0.046	0.04	0.04	0.04	0.047	0.04	0.04	0.04	0.051	0.04	0.04	0.04	0.04	**0.05**	**0.3**
1-hour SO2	1.29	1.21	1.13	1.02	1.24	1.10	1.02	0.92	1.23	1.04	1.02	0.88	0.84	**1.29**	**7.8**
3-hour SO2	0.58	0.55	0.60	0.57	0.58	0.51	0.55	0.51	0.63	0.51	0.55	0.48	0.47	**0.63**	**25**
24-hour SO2	0.28	0.26	0.27	0.27	0.28	0.24	0.27	0.25	0.29	0.24	0.25	0.23	0.23	**0.29**	**5**
Annual SO2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	**0.01**	**1**

AERMOD Results, ug/m3 - H1H 5-year average

	Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7	Max	SIL
1-hour NO2 (5yr avg)	3.58	3.34	3.16	3.01	3.45	3.03	2.87	2.73	3.42	2.86	2.85	2.58	2.39	**3.58**	**7.5**
*** 24-hour PM2.5 (5yr avg)**	0.59	0.52	0.53	0.48	0.60	0.48	0.53	0.53	0.66	0.47	0.50	0.50	0.53	**0.66**	**1.2**
*** Annual PM2.5 (5yr avg)**	0.044	0.039	0.040	0.036	0.045	0.036	0.039	0.040	0.049	0.035	0.038	0.037	0.040	**0.049**	**0.3**

*** PM2.5 5yr avg model runs include cooling tower impacts**

Scaled 1-hour Air Toxic Impacts

	Case 3	Case 12	Case 30	Case 4	Case 31	Case 2	Case 32	Case 33	Case 5	Case 34	Case 13	Case 35	Case 7	Max	MAGLC
H2SO4	0.410	0.439	0.418	0.376	0.433	0.394	0.363	0.353	0.431	0.388	0.382	0.337	0.293	**0.439**	4.76
NH3	5.964	5.575	5.147	4.679	5.721	5.062	4.657	4.274	5.634	4.804	4.677	4.015	3.778	**5.964**	404.8
Formaldehyde	0.094	0.090	0.083	0.076	0.089	0.082	0.075	0.069	0.087	0.078	0.076	0.065	0.061	**0.094**	6.5
Toluene	0.105	0.105	0.097	0.088	0.098	0.095	0.087	0.080	0.093	0.090	0.088	0.076	0.071	**0.105**	1786
Xylene	0.051	0.052	0.048	0.043	0.048	0.047	0.043	0.039	0.046	0.044	0.043	0.037	0.035	**0.052**	10333

Detailed AERMOD for the Turbines Under Normal Operating Conditions and Unit (1 g/s) Emissions (Max across 5 years model

Pollutant	Average	Group	Rank	Conc/Dep	East (X)	North (Y)	Elev	Hill	Flag	Time
OTHER	PERIOD	C3	1ST	0.02421	297300	4616400	178.3	178.3	0	8784 HRS
OTHER	PERIOD	C12	1ST	0.02435	297300	4616400	178.3	178.3	0	8784 HRS
OTHER	PERIOD	C30	1ST	0.03259	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C4	1ST	0.03789	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C31	1ST	0.02644	297300	4616400	178.3	178.3	0	8784 HRS
OTHER	PERIOD	C2	1ST	0.02515	297400	4616400	178.38	178.38	0	8784 HRS
OTHER	PERIOD	C32	1ST	0.03485	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C33	1ST	0.0401	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C5	1ST	0.02958	297300	4616400	178.3	178.3	0	8784 HRS
OTHER	PERIOD	C34	1ST	0.02776	297400	4616400	178.38	178.38	0	8784 HRS
OTHER	PERIOD	C13	1ST	0.03175	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C35	1ST	0.03672	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	PERIOD	C7	1ST	0.04183	297300	4616300	178.32	178.32	0	8784 HRS
OTHER	1-HR	C3	1ST	2.17131	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C12	1ST	2.17954	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C30	1ST	2.55292	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C4	1ST	2.71058	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C31	1ST	2.29299	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C2	1ST	2.23177	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C32	1ST	2.62111	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C33	1ST	2.80323	293700	4615100	180.64	180.64	0	10011713
OTHER	1-HR	C5	1ST	2.44319	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C34	1ST	2.36794	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C13	1ST	2.52534	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C35	1ST	2.67772	291500	4614500	184.33	184.33	0	10011713
OTHER	1-HR	C7	1ST	2.91114	293700	4615100	180.64	180.64	0	10011713
OTHER	3-HR	C3	1ST	0.97886	296800	4616500	178.92	178.92	0	10071815
OTHER	3-HR	C12	1ST	0.98347	296800	4616500	178.92	178.92	0	10071815
OTHER	3-HR	C30	1ST	1.35827	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C4	1ST	1.50716	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C31	1ST	1.07495	297200	4616600	180.73	180.73	0	9042712
OTHER	3-HR	C2	1ST	1.02945	297500	4616300	178.29	178.29	0	9092812
OTHER	3-HR	C32	1ST	1.42018	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C33	1ST	1.56274	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C5	1ST	1.25409	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C34	1ST	1.15393	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C13	1ST	1.3592	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C35	1ST	1.47452	297400	4616200	178.4	178.4	0	10090718
OTHER	3-HR	C7	1ST	1.61311	297400	4616200	178.4	178.4	0	10090718
OTHER	8-HR	C3	1ST	0.87496	295500	4615400	186.96	186.96	0	11041516
OTHER	8-HR	C12	1ST	0.87926	295500	4615400	186.96	186.96	0	11041516
OTHER	8-HR	C30	1ST	1.12958	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C4	1ST	1.28113	297300	4616200	178.42	178.42	0	10072316
OTHER	8-HR	C31	1ST	0.94597	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C2	1ST	0.92069	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C32	1ST	1.19127	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C33	1ST	1.35761	297300	4616200	178.42	178.42	0	10072316
OTHER	8-HR	C5	1ST	1.05082	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C34	1ST	1.01642	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C13	1ST	1.11291	295700	4615500	182.17	182.17	0	11041516
OTHER	8-HR	C35	1ST	1.26448	297300	4616200	178.42	178.42	0	10072316
OTHER	8-HR	C7	1ST	1.39551	297300	4616200	178.42	178.42	0	10072316
OTHER	24-HR	C3	1ST	0.47392	297100	4616700	177.95	177.95	0	8060624
OTHER	24-HR	C12	1ST	0.47601	297100	4616700	177.95	177.95	0	8060624
OTHER	24-HR	C30	1ST	0.62207	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C4	1ST	0.72368	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C31	1ST	0.51072	297100	4616600	178.4	178.4	0	8060624
OTHER	24-HR	C2	1ST	0.49113	297100	4616600	178.4	178.4	0	8060624
OTHER	24-HR	C32	1ST	0.67931	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C33	1ST	0.75999	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C5	1ST	0.57231	297100	4616600	178.4	178.4	0	8060624
OTHER	24-HR	C34	1ST	0.54861	297100	4616600	178.4	178.4	0	8060624
OTHER	24-HR	C13	1ST	0.60902	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C35	1ST	0.70522	297000	4616500	178.61	178.61	0	8060624
OTHER	24-HR	C7	1ST	0.78496	297000	4616500	178.61	178.61	0	8060624

Note: Group name refers operation case number. Source groups include both turbines each modeled with unit (1 g/s) emission rates.

Detailed AERMOD Results for CO Under Startup/Shutdown Conditions (Max Across 5 years)

Pollutant	Average	Group	Rank	Conc/Dep	East (X)	North (Y)	Elev	Hill	Flag	Time
CO	1-HR	CS	1ST	207.9099	293700	4615100	180.64	180.64	0	10011713
CO	1-HR	CS	2ND	159.6514	294300	4615300	177.66	177.66	0	11102609
CO	1-HR	WS	1ST	125.4908	293700	4615100	180.64	180.64	0	10011713
CO	1-HR	WS	2ND	100.1093	294800	4614400	181.61	181.61	0	12032409
CO	1-HR	HS	1ST	101.3135	291500	4614500	184.33	184.33	0	10011713
CO	1-HR	HS	2ND	81.19217	294800	4614400	181.61	181.61	0	12032409
CO	1-HR	SD	1ST	40.29223	291500	4614500	184.33	184.33	0	10011713
CO	1-HR	SD	2ND	32.19319	294700	4614300	181.93	181.93	0	12032409
CO	8-HR	CS	1ST	99.99065	297300	4616200	178.42	178.42	0	10072316
CO	8-HR	CS	2ND	95.84904	297300	4616300	178.32	178.32	0	9080916
CO	8-HR	WS	1ST	60.94674	297300	4616200	178.42	178.42	0	10072316
CO	8-HR	WS	2ND	56.86655	297300	4616300	178.32	178.32	0	9080916
CO	8-HR	HS	1ST	48.58353	297300	4616200	178.42	178.42	0	10072316
CO	8-HR	HS	2ND	45.19616	297300	4616300	178.32	178.32	0	9080916
CO	8-HR	SD	1ST	17.64207	295700	4615500	182.17	182.17	0	11041516
CO	8-HR	SD	2ND	16.4097	297300	4616300	178.32	178.32	0	9080916

Notes:

CS: Cold Start

WS: Warm Start

HS: Hot Start

SD: Shut Down

Detailed AERMOD Results for NO2 Under Startup/Shutdown Conditions (5-Year Averages)

Pollutant	Average	Group	Rank	Conc/Dep	East (X)	North (Y)	Elev	Hill	Flag	Time
NO2	1ST-HIGHEST MAX DAILY 1-HR	HS2	1ST	21.40615	297400	4616200	178.4	178.4	0	5 YEARS
NO2	1ST-HIGHEST MAX DAILY 1-HR	WS2	1ST	26.73319	297400	4616200	178.4	178.4	0	5 YEARS
NO2	1ST-HIGHEST MAX DAILY 1-HR	CS2	1ST	41.43484	297400	4616200	178.4	178.4	0	5 YEARS
NO2	1ST-HIGHEST MAX DAILY 1-HR	SD2	1ST	10.3594	295000	4614400	181.51	181.51	0	5 YEARS
NO2	8TH-HIGHEST MAX DAILY 1-HR	HS2	1ST	16.42139	296900	4616500	179.9	179.9	0	5 YEARS
NO2	8TH-HIGHEST MAX DAILY 1-HR	WS2	1ST	20.78652	296900	4616500	179.9	179.9	0	5 YEARS
NO2	8TH-HIGHEST MAX DAILY 1-HR	CS2	1ST	32.22774	297300	4616300	178.32	178.32	0	5 YEARS
NO2	8TH-HIGHEST MAX DAILY 1-HR	SD2	1ST	7.79519	296900	4616500	179.9	179.9	0	5 YEARS

Notes:
CS2: Cold Start
WS2: Warm Start
HS2: Hot Start
SD2: Shut Down

Detailed AERMOD Results for PM2.5 Under Normal Operating Conditions (5-Year Averages)

Pollutant	Average	Group	Rank	Conc/Dep	East (X)	North (Y)	Elev	Hill	Flag	Time
PM25	ANNUAL	C3	1ST	0.04405	297400	4616400	178.38	178.38	0	5 YEARS
PM25	ANNUAL	C12	1ST	0.03904	297400	4616400	178.38	178.38	0	5 YEARS
PM25	ANNUAL	C30	1ST	0.03996	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C4	1ST	0.03615	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C31	1ST	0.04458	297400	4616400	178.38	178.38	0	5 YEARS
PM25	ANNUAL	C2	1ST	0.03604	297400	4616400	178.38	178.38	0	5 YEARS
PM25	ANNUAL	C32	1ST	0.03915	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C33	1ST	0.04003	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C5	1ST	0.04882	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C34	1ST	0.03472	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C13	1ST	0.03775	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C35	1ST	0.03706	297300	4616300	178.32	178.32	0	5 YEARS
PM25	ANNUAL	C7	1ST	0.03956	297300	4616300	178.32	178.32	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C3	1ST	0.59242	297500	4616400	178.24	178.24	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C12	1ST	0.52428	297500	4616400	178.24	178.24	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C30	1ST	0.52952	297000	4616500	178.61	178.61	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C4	1ST	0.4813	297000	4616500	178.61	178.61	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C31	1ST	0.59528	297100	4616600	178.4	178.4	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C2	1ST	0.48435	297100	4616700	177.95	177.95	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C32	1ST	0.52558	297000	4616500	178.61	178.61	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C33	1ST	0.53054	297000	4616500	178.61	178.61	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C5	1ST	0.65593	297100	4616600	178.4	178.4	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C34	1ST	0.47421	297100	4616600	178.4	178.4	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C13	1ST	0.50264	297100	4616600	178.4	178.4	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C35	1ST	0.49692	297000	4616500	178.61	178.61	0	5 YEARS
PM25	1ST-HIGHEST 24-HR	C7	1ST	0.5266	297000	4616500	178.61	178.61	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C3	1ST	0.35999	297400	4616400	178.38	178.38	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C12	1ST	0.31884	297400	4616400	178.38	178.38	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C30	1ST	0.318	297300	4616300	178.32	178.32	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C4	1ST	0.28146	297200	4616300	178.37	178.37	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C31	1ST	0.36184	297400	4616400	178.38	178.38	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C2	1ST	0.29317	297400	4616400	178.38	178.38	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C32	1ST	0.30813	297300	4616300	178.32	178.32	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C33	1ST	0.31158	297200	4616300	178.37	178.37	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C5	1ST	0.39349	297200	4616300	178.37	178.37	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C34	1ST	0.28098	297300	4616300	178.32	178.32	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C13	1ST	0.30172	297300	4616300	178.32	178.32	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C35	1ST	0.29155	297200	4616300	178.37	178.37	0	5 YEARS
PM25	8TH-HIGHEST 24-HR	C7	1ST	0.30515	297200	4616300	178.37	178.37	0	5 YEARS

Note: Group name refers operation case number. Source groups include both turbines and cooling contribution.

Appendix B: Acoustic Analysis Update

To: Oregon Clean Energy, LLC
From: Tetra Tech, Inc.
Subject: Oregon Clean Energy Center – Acoustic Analysis Update
Date: August 11, 2014

The Oregon Clean Energy Center (the Project), a natural gas-fired, combined-cycle power plant, has been permitted under the Ohio Power Siting Board (OPSB) process and received an Opinion, Order and Certificate (Certificate) on May 1, 2013. As a part of the permitting process, an acoustic analysis was conducted for two potential Project scenarios (Siemens turbines and Mitsubishi turbines), which demonstrated compliance with the City of Oregon 75 A-weighted decibels (dBA) property line limit. In addition to the 75 dBA property line limit, the Certificate presumes that commitments documented in the application will be met, and states that "The sound pressure levels for the two turbine models ranged from approximately 56.5 to 58.5 dBA at the next nearest residence."[1]

Oregon Clean Energy, LLC (OCE) has now selected Siemens technology for the Project, as well as its Engineering, Procurement and Construction (EPC) contractor. As the Project has finalized that selection, refinements to the design and layout have occurred, including the addition of an approximately 7.5-acre parcel, adjacent to the north of the original Project site, for the location of the Project electrical switchyard. Tetra Tech has revised the acoustic analysis previously conducted with the updated site layout and design information to verify that sound levels identified through the OPSB review process can be maintained with the various updates. For the purposes of the revised acoustic analysis, Project compliance is assumed to be achieved when noise levels are at or below 75 dBA at the property line and at or below 58.5 dBA at the next nearest residence, considered the critical receptor. This receptor location is indicated as R2 on the figure provided in Attachment A.

Note that, although the analysis reflects the currently understood configuration and reasonable assumptions regarding mitigation measures, the Project's final design will likely incorporate additional changes. The EPC contractor, however, is committed to maintaining the compliance levels reflected in the OPSB application and Certificate.

Acoustic Modeling Methodology

The CadnaA computer noise model was used to calculate sound pressure levels from normal steady state operation of the Project equipment at receptors in the vicinity of the site. An industry standard, CadnaA was developed by DataKustik GmbH to provide an estimate of received sound levels at specified distances from sound sources of known emission. CadnaA's propagation equations are based on the International Organization for Standardization (ISO) standard ISO 9613 "Acoustics – Attenuation of Sound During Propagation Outdoors" which is a common approach to assessing noise attenuation outdoors from known industrial noise sources. The engineering methods specified in this standard consist of full octave band sound frequency algorithms and were adjusted to account for site-specific ground absorption, topography, and propagation under a standardized meteorological condition. The modeling analysis includes calculations for octave band frequencies spanning from 31.5 Hertz (Hz) to 8,000 Hz.

The Project's general arrangement was reviewed and directly imported into the acoustic model so layout and equipment modifications could be easily identified. Figure 1a shows the revised Project equipment

[1] The reference to "the next nearest residence" reflected the fact that sound levels at R1 (located to the north of the site and the nearest residence) were projected to be higher than the specified values (64.7 dBA equivalent sound level [Leq] for the Siemens layout). This was determined to be acceptable based upon the industrial context of the residence and the requirement for the Project to develop and implement a complaints process for resolving noise-related issues should they arise.

layout from Drawing No. "279429-1STA-G1001" dated May 22, 2014, and Figure 1b adds information updates from Black & Veatch on June 23, 2014.

The revised layout (Figure 1a) shows a 345-kilovolt (kV) substation (shown in orange), which is located immediately north of the power generation area. Information provided by the design engineers indicates that there will be no transformers or other noise-generating equipment planned for this installation; therefore, it is not expected to appreciably change the noise footprint of the facility. In addition, there is a gas yard upgrade proposed in the western area of the property, shown in red, in association with a proposed natural gas pipeline. As was the case for the OPSB application, the gas yard was not included in this analysis; it is presumed that appropriate consideration of sound levels will be a component of the natural gas pipeline review and approvals.

Figure 1a – Site Plan Layout Overview

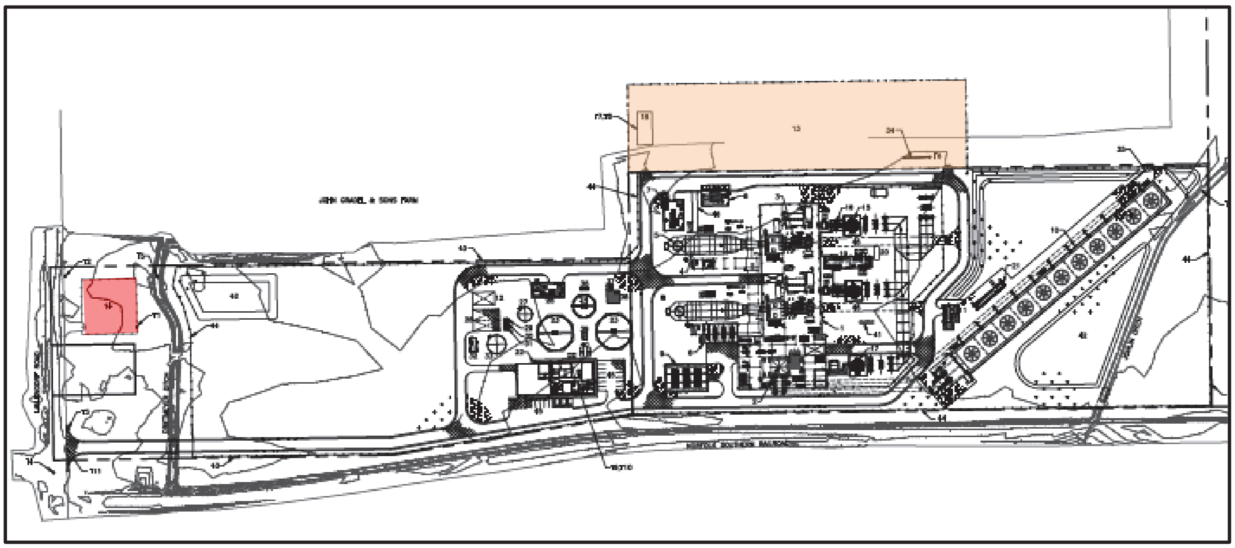
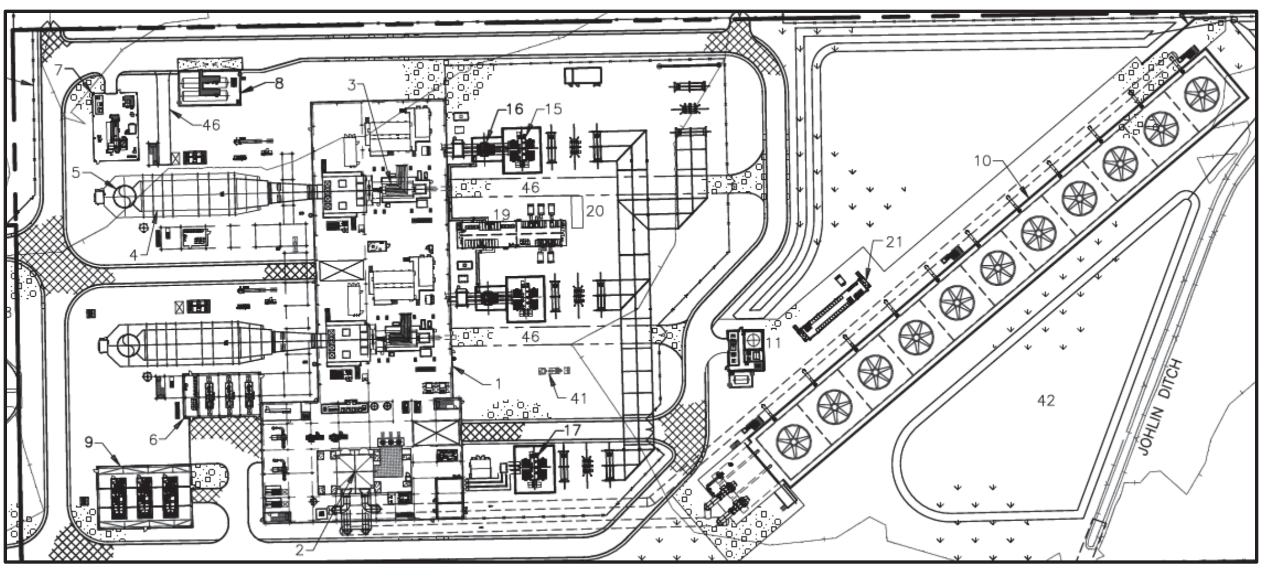


Figure 1b – Power Generation and Cooling Tower Area Close-up



A three-dimensional computer model of the facility was created directly from the site plan by defining the height and extent of significant noise sources. The dimensions and layout of the buildings, tanks, stacks, and other equipment were modeled according to the Project's equipment layout as shown in the Figures 1a and 1b. Each noise-radiating element was modeled based on its noise emission pattern. For example, building walls are defined as vertical area sources and smaller sources such as pumps are defined by individual point sources. The reflective characteristic of the structure is quantified by its reflection loss, which is typically defined as smooth façade from which the reflected sound energy is 2 dB less than the incident sound energy.

The propagation calculation parameters are described in Table 1. Propagation calculations under the ISO 9613 standard incorporate meteorological conditions favorable to propagation from sources of known sound emission, such as downwind condition and moderate atmospheric inversion. Correspondingly, no additional corrections for meteorological conditions, beyond those incorporated into the ISO standard, were applied in the calculations. The local terrain geometric data is input into the model based on the United States Geological Survey (USGS) digital elevation datasets to accurately represent terrain in three dimensions. Also critical to the modeling results is accounting for the effects of ground absorption. Ground absorption can vary from 0.0 (completely reflective) to 1.0 (completely absorptive). The receiver height is set to 5 feet (1.52 meters) above the ground level, which represents the approximate height of the ears of a person when standing.

Table 1 – Acoustic Modeling Setup Parameters

Model Input	Parameter Value
Standards	ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors
Engineering Design	Site plan dated May 22, 2014, updated June 23, 2014
Reflection Loss	2 dB – indicates reduction in acoustic energy due to reflection
Reflections	Two reflections (from buildings and obstacles) were allowed for individual acoustic rays during propagation calculations
Terrain Parameters	Digital elevation dataset to accurately represent terrain in three dimensions and incorporating grading changes to the U.S. Geological Survey digital elevation data
Ground Absorption	0.5 (semi-reflective) and 0.0 (reflective) on-site
Receiver Characteristics	1.52 meters (5 feet) above ground level
Meteorological Factors	Omni-directional downwind propagation / mild to moderate atmospheric temperature inversion
Temperature	50°F (10°C)
Relative Humidity	70%

Noise data for the various components of the Project equipment were either supplied by the OCE team or developed from Tetra Tech's database. Noise data for the power generation package was provided to the Project by Siemens. The reference sound source data for the equipment as input to CadnaA are provided in Table 2 by Octave Band Center Frequency (OBCF). These values reflect mitigated levels. In addition to these mitigated levels, silencers were applied to the gas turbine (GT) air inlet faces, and transmission loss ratings were incorporated into the wall and roof assemblies of the GT air inlet filter houses, gas compressor building, and boiler feed pump enclosure. Note that, while the OPSB application reflected the use of sound walls as a mitigation measure, OCE prefers to utilize other means to reduce sound levels and has eliminated the walls. As previously noted, the specific mitigation measures incorporated into the final design are anticipated to reflect additional changes prior to construction.

Table 2 – Facility Sound Source Levels in OBCF*

Description	31.5	63	125	250	500	1K	2K	4K	8K	A-Weighted
GT Inlet Filter House	127	120	111	96	74	88	77	78	84	99
GT Inlet Duct Wall Radiated - Lagged - Each GT	121	119	117	104	90	101	91	88	91	105
GT Enclosure Walls	93	105	88	79	78	83	85	85	75	91
GT Enclosure Air Inlet Vents- Each GT	88	101	82	77	72	69	72	78	83	85

Table 2 – Facility Sound Source Levels in OBCF*

Description	31.5	63	125	250	500	1K	2K	4K	8K	A-Weighted
GT Enclosure Air Discharge Vents - Each GT	90	102	85	76	71	71	69	74	78	82
GT Exhaust Diffuser & Expansion Joint - Each GT	133	124	111	110	103	101	100	95	79	108
GT Fuel Gas Systems - Each GT	104	100	89	81	80	86	88	91	89	96
GT Generator, Hydrogen-cooled - Each GT	117	123	120	112	113	109	113	111	108	118
Enclosed Lube Oil Package - Each GT	94	94	100	95	97	92	89	85	80	98
Heat Recovery System Generator (HRSG) Inlet Transition Duct Radiated - Each HRSG	115	114	104	100	92	90	93	87	75	99
HRSG Wall Radiated - Each HRSG	115	114	104	100	92	90	93	87	75	99
HRSG Exhaust Stack Wall Radiated - Each HRSG	112	111	101	96	88	84	82	73	60	93
HRSG Exhaust Stack Exit - w/o Directivity - Each HRSG	119	111	120	115	115	105	84	63	48	114
HRSG Duct Burner Gas Piping - Each HRSG	104	101	91	84	85	93	98	101	98	105
Steam Turbine - Total - Indoor Unenclosed Design	n/a	115	116	111	110	105	106	106	100	113
Hydrogen-cooled Generator for Steam Turbine	117	123	120	112	113	109	113	111	108	118
Unenclosed Lube Oil Package - Steam Turbine	96	100	98	105	102	97	97	92	83	104
Steam Turbine Control Oil Supply Skid	n/a	109	103	105	104	105	100	99	96	109
Boiler Feed Water Pump - Each	101	106	108	99	104	103	102	97	93	108
Steam Surface Condenser	110	110	106	105	104	106	105	105	101	112
Condensate Extraction Pump - Each	92	106	101	99	99	98	98	93	91	104
Generation Building Roof Vent Fans	96	106	97	94	91	90	85	77	66	94
Main GSU Transformer - Each GT and steam turbine	106	106	110	110	110	94	89	82	77	108
Auxiliary Transformer - Each	87	87	91	88	94	86	76	71	65	93
Circulating Water Pump - Each	102	102	99	97	98	102	93	90	81	104
Selective Catalytic Reduction Ammonia Skid - Each	99	98	90	92	95	97	93	88	86	100
Demineralized Water Forwarding Pump - Each	88	82	82	85	92	95	96	92	84	101
Miscellaneous Pumps	71	78	79	86	91	88	86	88	85	95
Gas Compressor	98	97	100	104	105	106	103	98	93	110
Fuel Gas Heater	84	88	93	85	94	97	98	101	91	105
Air Compressor	92	91	90	87	86	83	80	77	75	88
Clarifier	86	86	89	87	87	88	91	89	87	96
Water Treatment Building	79	80	79	81	83	82	81	75	68	87

* dB re 10^{-12} watt

The wet cooling tower location and design have changed significantly from the configuration reflected in the original OPSB application. Its noise design target is based on achieving a far-field sound level of 56 dBA +/- 3 dBA at a reference distance of 500 feet on the cased side and 58 +/- 3 dBA on the open air inlet side. In addition, a near field design target of 75 dBA at a reference distance of 50 feet from the wet cooling tower inlet face and 72 dBA from the cased face is also necessary for conformance purposes.

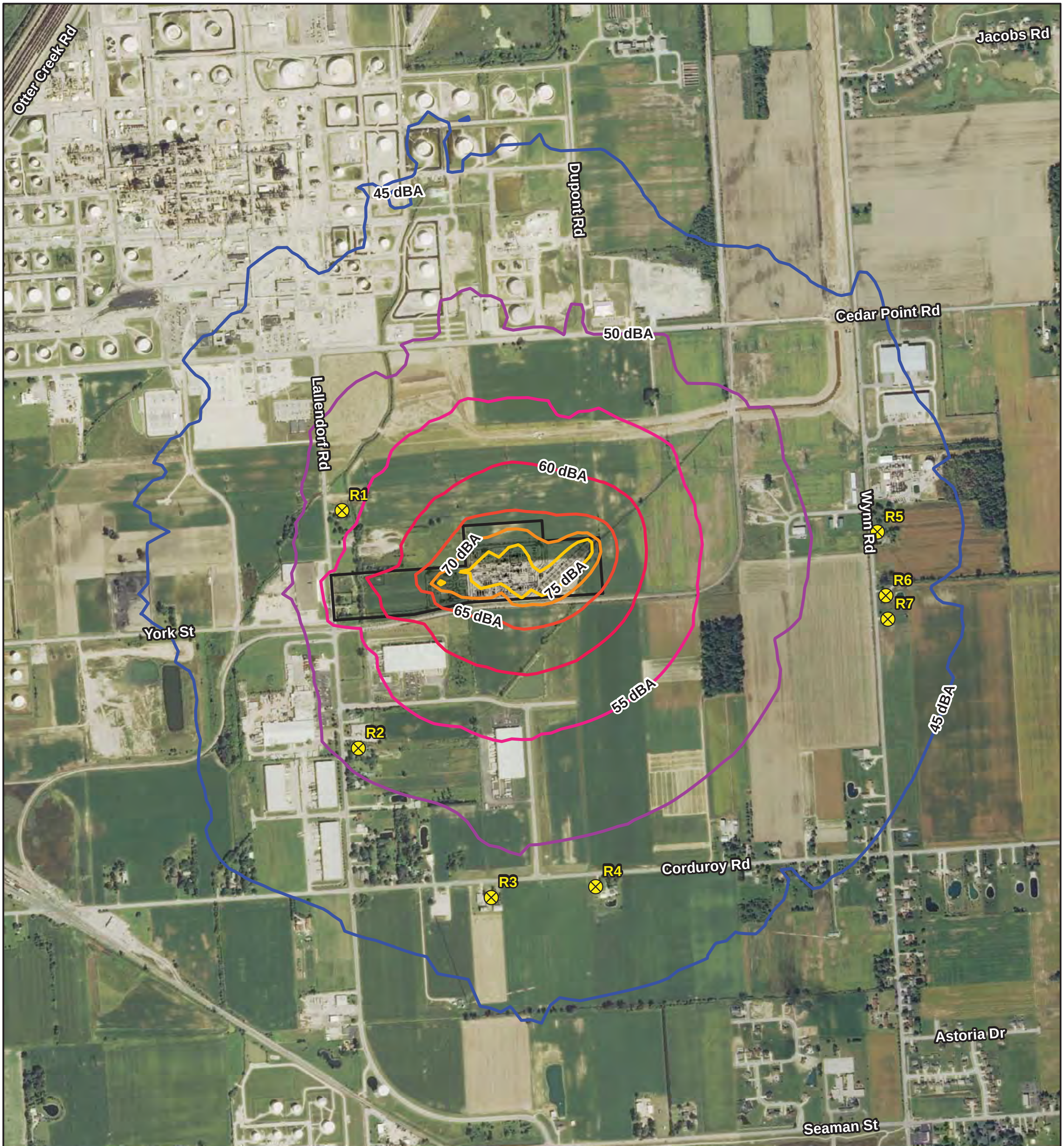
Compliance Assessment

Using the updated source noise data given in Table 2 and the wet cooling tower acoustic design goals, operational broadband sound pressure levels were calculated during normal steady state operation, assuming that all components are operating continuously and concurrently at the representative manufacturer-rated sound levels. The analysis demonstrates compliance at the next nearest receptor (R2) and with the more restrictive 75 dBA property line limit. To meet this limit, the relocated and reconfigured wet cooling tower will be required to be of a low noise design, as noted above. Candidate mitigation options to achieve compliance include the use of low noise fans, splash attenuator, and a parapet or ground mounted barrier to block the sound.

The acoustic modeling results are presented in the attached sound contour plot displaying broadband (dBA) sound levels presented as color-coded isopleths (Attachment A). The sound level contours are independent of the existing acoustic environment, i.e., representative of expected Project-generated sound levels only. The predicted received sound level at the “next nearest receptor,” as identified by the OPSB (R2), is 51 dBA (compared to 58.5 dBA for the original application layout); therefore, sound levels are well below the sound pressure level range of 56.5 to 58.5 dBA prescribed in the Project Certificate. In addition, R1, which is located to the north of the western area of the property and even closer to the Project site, is also in compliance with the Certificate requirement with a predicted received sound level of 54 dBA (previously calculated as 64.7 dBA), likely reflecting the relocation of the cooling tower to the east. Sound levels decrease with distance; as shown in Attachment A, compliance with the applicable limits at the closest receptors reflects compliance at all other more distant residential locations. The validity of the modeling results present design parameters and layout described and that we cannot and do not warrant any design parameters and conditions that may exist, but which were not represented in this study. Therefore, it should be noted that any modifications to the equipment may result in differences in noise generation. Any increases in the Project’s noise resulting from future changes to the equipment may also invalidate current sound level predictions. OCE and the EPC contractor will continue to coordinate with the OPSB as final design details are developed to confirm compliance with the sound level commitments.

ATTACHMENT A

Sound Contour Figure



Noise Sensitive Receptors

Property Limit

Sound Isopleths (dBA Leq)

45 50 55 60 65 70 75

Oregon Clean Energy Center

Lucas County, Ohio

Noise Contours
During Normal Operation

0 1,000 2,000 4,000

Feet

Overview

Path: P:\Noise\Oregon Clean Energy Center\Acoustic Modeling\GIS\20140805_RSL.mxd

Appendix C: Switchyard Parcel Archaeological Review

Phase I Cultural Resource Management Investigations for an Approximately 3.0 ha (7.5 ac) Switchyard Area in Oregon Township, Lucas County Ohio

Ryan Weller

May 29, 2014

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Phase I Cultural Resource Management Investigations for an Approximately 3.0 ha (7.5 ac) Switchyard Area in Oregon Township, Lucas County Ohio

By

Ryan Weller

Submitted By:

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Lead Agency:

Ohio Power Siting Board (OPSB)

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May 29, 2014

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W-1432

i. Abstract

In May of 2014, Weller & Associates, Inc. conducted Phase I Cultural Resource Management Investigations for an approximately 3.0 ha (7.5 ac) Switchyard Area in Oregon Township, Lucas County Ohio. The lead agency for this undertaking is the Ohio Power Siting Board. A cultural resources management survey was deemed necessary to identify any sites or properties and to evaluate them for the National Register of Historic Places (NRHP) and per the requirements for the associated agency. The work involved a literature review and field investigations. The archaeological investigations for this project identified one previously unrecorded archaeological site, 33LU806. This site is not considered to be significant.

The project area is located in the upland, flat Lake Plains Region that is to the east of the Maumee River at Toledo and south of Lake Erie. The area is located on the north side of an existing railroad easement and is to the north of a proposed power plant. There are individual residences situated on lots that have frontage on Lallendorf Road, but there are none that are within or immediately adjacent to the project area. The project area is contained in a very flat, upland area. The type of development and construction that is planned in this area is amiable within this setting. The surrounding terrain is, and has been, the subject of industrialization since the late nineteenth century. Oil, gas, radio, and electric facilities and constructs surround this project with little for its preceding agricultural present or past.

A literature review conducted for this project indicated the area immediately to the south and east had been the subject of previous investigations (Weller and Barrett 2012; Weller 2013). This survey was for the proposed Oregon Clean Energy Center. The field investigations for this previous project identified two architectural resources (LUC-4628-10 & LUC-4629-10) as well as two historic period archaeological sites (33LU801 and 802) within this area. None of these previously identified resources were considered to be significant and no further work was deemed necessary in this area.

These investigations involved surface collection methods as well as visual inspection. The site identified within the project area (i.e., 33LU806) is not considered to be significant. This project is not considered to have an adverse affect on any historic properties. No further work is deemed necessary for this project.

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Introduction

In May of 2014, Weller & Associates, Inc. (Weller) conducted Phase I Cultural Resource Management Investigations for an approximately 3.0 ha (7.5 ac) Switchyard Area in Oregon Township, Lucas County, Ohio (Project Area) (Figures 1-3). The work was completed for Tetra Tech, Inc. These investigations were necessary to identify any sites or properties and to evaluate them for the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 United States Code [U.S.C.] 470 [36 Code of Federal Regulations [CFR] 800]). The lead agency for this undertaking is the Ohio Power Siting Board (OPSB). This report summarizes the results of the fieldwork and literature review. The report format and design is similar to that established in *Archaeology Guidelines* (Ohio Historic Preservation Office [OHPO] 1994).

The Project Area is located to the north of a Norfolk & Western Railroad spur and is east of N. Lallendorf Road. There are two ditches that bracket the Project Area to facilitate drainage to its otherwise flat terrain. The Oregon Clean Energy Center, a proposed natural gas fired combined cycle generating facility, has acquired an additional parcel of approximately 3.0 ha (7.5 ac) more proximate to its point of electrical interconnection in order to construct the project's substation. The surrounding area is mixed in use, largely consisting of extensive industrial developments. These investigations were conducted for the development of a proposed switchyard relative to the construction of a proposed power generating facility. The related and abutting facility may include the construction of two stacks presumed to be a maximum height of 84 meters (m) (275 feet [ft]) and its tallest building approximately 33.5 m (110 ft) tall.

Ryan Weller conducted the literature review for the Phase I investigations in May 2014. Ryan Weller served as the Principal Investigator and Project Manager. The field crew included Abraham Ledezma, Jose Ledezma, Seth Cooper, and Alex Thomas. The report preparation was by Mr. Weller, with Chad Porter completing the figures.

The following sections provide an overview of the environmental setting of the Project Area and its surroundings to provide a physical context for the assessment; a description of the cultural setting; a discussion of the research design for the Phase I evaluation; a summary of literature supporting field efforts; findings of the field reconnaissance; and an analysis of the potential effects associated with the Project.

Environmental Setting

Climate

Lucas County, like all of Ohio, has a continental climate with hot and humid summers and cold winters. About 79 centimeters (cm) (31 inches [in]) of precipitation falls annually on the county, with the average monthly precipitation about 6.6 cm (2.6 in). February is the driest month, while June is the wettest month (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1980).

Physiography, Relief, and Drainage

Lucas County is located within the Huron-Erie Lake Plains physiographic region of Ohio (Brockman 1998). According to Brockman (1998), the Project Area is located on the Maumee Lake Plains. This region is characterized by "flat-lying Ice-age lake basin with beach ridges, bars, dunes, deltas, and clay flats; contained the former Black Swamp, slightly dissected by modern streams; elevation 570-800 ft" [Brockman 1998].

The major watersheds in the county are Lake Erie and the Maumee River. Other larger streams that flow through the county include the Ottawa River, Ten Mile Creek, Duck Creek, Otter Creek, Swan Creek, and Crane Creek. The Project Area is drained by Driftmeyer Ditch and Johlin Ditch.

Geology

Lucas County is comprised of Late Wisconsinan-age sand over clay till and lacustrine deposits. Below the till and lacustrine deposits are Devonian-age carbonate rocks and shales. The Project Area is contained within an area of Silurian and Devonian-age carbonate rocks (Brockman 1998; USDA, SCS 1980).

Soils

The Project Area is located in the Latty-Toledo-Fulton association. This association is characterized by "level to gently sloping, very poorly drained and somewhat poorly drained soils that formed in clayey glacial lake sediment" (USDA, SCS 1980). There are two specific soils that were encountered within the Project Area (Table 1).

Table 1. Soils in the Project.

Soil Symbol	Soil Name	% Slope	Location
FuA	Fulton silty clay loam	0-2	Lake Plains
Lc	Latty silty clay	0-2	Lake Plains

Flora

There is, or at least was great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999). The following provides comparable context to demonstrate how the Project Area is similar or differentiated within the framework to that of Ohio as a whole.

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments, such as those in Wyandot and Marion County areas, would contain islands of forests, but were mostly expansive open terrain dominated by grasses.

The Project Area is located in northwestern Ohio. The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, entrenched stream valleys and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains (Black Swamp region) except for the occasional patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests. Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio, from about Cincinnati to Bellefontaine east to the Scioto River, historically contained a very diverse floral landscape. This is an area where moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forest types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands are in glacial areas, but are still patchy. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999).

Northeastern Lucas County, including the Project Area, is generally within what is considered to be an elm-ash swamp and mixed oak forest area (Gordon 1966).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e., wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone also offered significant species diversity. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fish and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, while the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or surface scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, and giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the Late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid, as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Fitting 1963). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time, including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Demographic mobility was necessary, but there was an increased reliance upon resources associated with riparian-related and ecotones systems. Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time. Cultural and artifactual phenotypes seem to become cohesive within a specific area and differentiate themselves from others.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the creation of greater social and material culture complexity. The environment at this time is warmer and drier. This allowed longer occupation and land use of areas that were previously undesirable or inhabited on a logistically and functionally limited basis.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). In northern and northwestern Ohio, the Glacial Kame culture dominates the Terminal Late Archaic period. Pottery makes its first appearance during the Terminal Late Archaic.

The Early Woodland period (ca 3000-2100 B.P.) in Ohio is often associated with the Adena culture and the early mound builders (Dragoo 1976). Early and comparably simple geometric earthworks first appear with mounds more spread across the landscape. Pottery at this time is thick and tempered with grit, grog, or limestone; however, it becomes noticeably thinner towards the end of the period. There is increased emphasis on gathered plant resources, including maygrass, chenopodium, sunflower, and squash. Habitation sites have been documented that include structural evidence. Houses that were constructed during this period were circular, having a diameter of up to 18.3 m (Webb and Baby 1963) and often had paired posts that define the walls (Cramer 1989). Artifacts dating from this period include leaf-shaped blades with parallel to lobate hafting elements, drilled slate pieces, ground stone, thick pottery, and increased use of copper. Early Woodland artifacts can be recovered from every region of Ohio.

In northwest and north-central Ohio, there are not very many mounds or village sites that indicate an Early Woodland occupation. Artifacts from these areas often are reflective of seasonal hunting excursions. Adena-like bifaces and tools are commonly found in river and stream valleys that drain into Lake Erie, as well as in the uplands. It is assumed that Early Woodland inhabitants used these areas for little more than a transient hunting-collecting subsistence. One of the best-known Early Woodland sites is the Leimbach site. This site is located where the Huron River empties into Lake Erie (Shane 1975). Early Woodland ceramics and lugged vessels have been recovered from this site. Evidence of Early Woodland activity, such as ceramics, has been encountered infrequently at locations across north central and northwestern Ohio.

The Middle Woodland period (ca 2200-1600 B.P.) is often considered to be equivalent with the Hopewell culture. The largest earthworks in Ohio date from this period. There is dramatic increase in the appearance of exotic materials that appear most often in association with earthworks and burials. Artifacts representative of this period include thinner, grit-tempered pottery, dart-sized projectile points (Lowe Flared, Steuben, Snyders, and Chesser) (Justice 1987), exotic materials (mica, obsidian, and marine shell, etc.). The points are often thin, bifacially beveled, and have flat cross sections. There seems to have been a marked increase in the population as well as increased levels of social organization. Middle Woodland sites seem to reflect a seasonal exploitation of the environment. There is a notable increase in the amount of Eastern Agricultural Complex plant cultigens, including chenopodium, knotweed, sumpweed, and little barley. This seasonal exploitation may have followed a scheduled resource extraction year in which the populations moved camp several times per year, stopping at known resource extraction loci. Middle Woodland land use appears to center on the regions surrounding earthworks (Dancey 1992; Pacheco 1996); however, there is evidence of repeated occupation away from earthworks (Weller 2005). Household structures at this time vary with many of them being squares with rounded corners (Weller 2005). Exotic goods are often attributed to funerary activities associated with mounds and earthworks. Utilitarian items are more frequently encountered outside of funerary/ritual contexts. The artifact most diagnostic of this period is the bladelet, a prismatic and thin razor-like tool, and bladelet cores. Middle Woodland remains are more commonly recovered from south-central Ohio and are less commonly found in most areas in the northern and southeastern part of the state.

Little information is known about the Middle Woodland period of western and northwestern Ohio. This may be due to a poor representation of artifacts from this period or because the area is not directly associated with the Hopewell culture. The loosely associated patterns of earthworks to habitation sites that have been identified in central and southern Ohio areas are not present in this region. Sites associated with this period have been identified along the south and western shores of Lake Erie, but they are not common (Stothers et al. 1979; Stothers 1986).

The Late Woodland period (ca A.D. 400-900) is distinct from the previous period in several ways. There appears to be a population increase and a more noticeable aggregation of groups into formative villages. The villages are often positioned along large streams, on terraces, and were likely seasonally occupied (Cowan 1987). This increased sedentism was due in part to a greater reliance on horticultural garden plots, much more so than in the preceding Middle Woodland period. The early Late Woodland groups were growing a wide variety of crop plants that are collectively referred to as the Eastern Agricultural Complex. These crops included maygrass, sunflower, and domesticated forms of goosefoot and sumpweed. This starch and protein diet was supplemented with wild plants and animals. Circa A.D. 800 to 1000, populations adopted maize agriculture, and around this same time, shell-tempered ceramics appear. Other technological innovations and changes during this time period included the bow and arrow and changes in ceramic vessel forms.

Evidence suggests that the Late Woodland occupations in northern Ohio developed from the Western Basin Middle Woodland tradition. The Late Woodland period in northern Ohio is best defined by ceramic traditions. Western Basin Late Woodland sites have been identified in most of the river valleys in northwestern Ohio such as the Maumee, Auglaize, and the Sandusky Rivers. Radiocarbon dating establishes this Late Woodland occupation at the first century B.C. to A.D. 500 (Pratt and Bush 1981: 88). The Western Basin tradition consists of three primary phases, which include the Riviere au Vase, the Younge (Fitting 1965), and the Springwells phase. Influence from the Cole complex may extend into the area from the south, but this remains theoretical and not well researched.

The Late Prehistoric period in northwest and northern Ohio is often associated with an intensification of the use of plant resources, the presence of large villages, and a steady population increase. Permanent villages were associated with a heavy dependence on farming. These villages were often located on the meander belt zones of river valleys (Stothers et al. 1984: 6). Subsistence of these farming communities relied upon maize, beans, and squash as the major cultigens. Villages were often strategically located on bluff tops. There is a change in social structure to a chiefdom-based society. The Late Prehistoric period in northwest Ohio has been segregated into the Sandusky tradition and smaller phases based largely on age and ceramic assemblage traits.

The Sandusky tradition has been broken up into four phases. These phases are identified (in chronological order) as Eiden, Wolf, Fort Meigs, and Indian Hills. These are often associated with a style of ceramic referred to as Mixter Tool Impressed, Mixter Dentate, Mixter Cordmarked, and Parker Festooned. The Eiden and Wolf phases show a dependence upon fishing, and villages are usually associated with large cemeteries (Schneider 2000; Shane 1967).

The Fort Meigs and Indian Hills phases occurred late in the Late Prehistoric period. The Fort Meigs phase may be related to the Wolf phase in that the pottery is similar. Fort Meigs phase occupations are identified by specific rim and neck motifs that are applied to their pottery. The Indian Hills phase is associated with shell-tempered pottery. Some villages show evidence of defensive features such as stockade lines, ditches, or earthen walls (Pratt and Bush 1981: 155). There is little evidence to support inter-village relationships, such as trade; this lack may have been due to competition for localized resources.

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as 'Lower Shawnee 2' existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War, ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River, but Americans were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region. The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio. These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Lucas County History

The history of Euro-American settlement in Lucas County begins with the French. Sometime near 1680, the French are reported to have built a fort, which acted as a trading post, at the falls of the Maumee River. This may be nothing more than tradition in order to bolster French claims to the region, but certainly the French were active along the Maumee River and used it extensively during the 1700s as a trade route. The first settlers in the county were Jean Baptiste Beaugrand and Gabriel Godfrey, who opened a trading house at the foot of the Maumee rapids in 1790. Other French traders, primarily from Detroit, traded along the Maumee, such as Peter Navarre who lived at the mouth of the river (Killits 1923; Knapp 1872; Scribner 1910; Waggoner 1888; Winter 1917).

The first American families arrived in 1807 and settled on the Maumee River. These early pioneers mainly traded with the Native Americans just like the French. American settlement of the region did not really grow until after the War of 1812. Increased settlement of the region led to concerns over the state boundaries of the Michigan Territory and the State of Ohio. The disputed boundary was Lucas County's northern border. As Michigan applied for statehood, they claimed land into what were Henry, Wood, and Sandusky Counties, Ohio. In retaliation, Ohio organized a new county named for the incumbent Governor of Ohio, Robert Lucas. This issue, which became a dispute between the two states, was called both "The Toledo War" and the “Ohio-Michigan War” and almost led to an armed conflict. The lands located in Lucas County that were disputed included Richfield, Sylvania, Washington, Oregon and Jerusalem townships and the northern parts of the townships of Spencer, Springfield and Adams.

The disputed boundaries were peacefully resolved on June 20, 1835, on which day Lucas County was formed and Toledo was made the county seat (Scribner 1910; Waggoner 1888).President Andrew Jackson found in favor of the established state and in reparation, accepted Michigan's bid for admission to the Union (Andreas and Baskin 1875; Howe 1888; Killits 1923; Knapp 1872; Scribner 1910; Waggoner 1888; Way 1896; Winter 1917).

Settlement of Lucas County was hampered throughout the 1800s by the Black Swamp and epidemics of malaria and cholera. Transportation was limited to improved Native American trails and to the principal watercourses, the Maumee, Ottawa, and Swan Rivers. New road construction began in the 1820s. In 1839, work on the canal along the Maumee River began. By 1842, the canal was opened between Toledo and Grand Rapids. The Miami and Erie Canal link up with the Maumee River occurred the following year. Railroads became an increasingly important means of transportation and means of importing and exporting goods after the 1850s. Between 1835 and 1836, a rail line was built between Toledo and Adrian, Michigan. In 1853, the Cleveland and Toledo (Lake Shore) Railroad was completed. By 1910, Toledo was ranked fourth in the nation as a railroad center, having fourteen lines running through it (Scribner 1910).

Toledo is the economic center of the county. The city has grown dramatically in the nineteenth and twentieth centuries and much of this has been caused by its position as an important link between canal traffic, railroads, and lake shipping (Killits 1923; Scribner 1910; Waggoner 1888; Winter 1917).

Oregon Township History

Oregon Township was created on June 11, 1837 from Port Lawrence and Manhattan Townships. In 1840, seven sections from the northwest portion of the township were annexed to the township of Manhattan. Then, both in 1856 and 1872, the township had its area further reduced, ceding land to the city of Toledo and the township of Port Lawrence. However, in 1874, a portion of Manhattan Township outside of Toledo was annexed back to Oregon Township increasing its size. Again in 1893, more land was taken to create Jerusalem Township (Scribner 1910; Waggoner 1888). In 1957, Oregon Township became the City of Oregon by way of popular vote. This action allowed the City of Oregon to own and operate its own wastewater treatment plant (City of Oregon 2012).

The City lies in the area once known as the "Black Swamp" and is located in the Maumee Lake Plains physiographic region. The topography is nearly level with a slight downward slope north toward Lake Erie (Waggoner 1888). The earliest documented occupation of present-day City of Oregon was an Ottawa village near the mouth of the Maumee River. The French had a trading post in the same vicinity as the Native American village with French settlers coming to the area around the year 1808. Among the French families to come to the area, the Navarre family still had descendents living in the county in 1910. The next Euro-Americans to settle the area were of English descent. This occurred during the 1820s and 1830s. Joseph Prentice came to the area and settled on the east side of the Maumee River in 1825. Luther Whitmore arrived next in 1829, then Robert Gardner in 1830 (Waggoner 1888).

Early Euro-American inhabitants found valuable timber in the Black Swamp area. The land was cleared and was subsequently drained by the creation of ditches in order to make it suitable for agriculture (Scribner 1910). Charles Jenison built the first steam powered saw mill in Oregon in the year 1836 on the Maumee River. The first road in the area ran from the Maumee River at Toledo to Woodville where it met up with the Maumee and Western Reserve Road. This road was known as the Woodville Road. At the road's intersection with the Maumee River, Herman Crane operated a flat-bottomed scow ferry. The first school in the City was built in 1834 on the Woodville Road. It was a log structure with classes taught by Elizur Stevens (Scribner 1910).

In the late 19th Century and early 20th Century, the oil industry began to develop in the area. The area possesses oil resources as well as a broad range of transportation resources including the Maumee River, extensive railroads, canals, and highways. These circumstances lead to two large oil refineries being established in the city and becoming the two largest employers in the area in recent years (City of Oregon 2012).

Phase I Survey Research Design

The purpose of a Phase I survey is to locate and identify cultural resources that will be affected by the planned switchyard. This includes archaeological deposits that may be found on the site, as well as architectural properties within the Area of Potential Effect (APE) that are older than 50 years. No surrounding buildings will be directly affected by the Project; however, the residences currently located within the Project Area will be demolished prior to construction of the Project. These were evaluated and not regarded as being significant.

Once cultural resources are identified and sampled, they are evaluated for their eligibility or potential eligibility to the NRHP. These investigations are directed to answer or address the following questions:

1) Did the literature review reveal anything that suggests the Project Area had been previously surveyed and, if so, what is the relationship of previously recorded properties to the Project?
2) Are cultural resources likely to be encountered in the Project Area?
3) Will the planned undertaking affect any archaeological or architectural properties?
4) Will any NRHP eligible sites or properties be affected by the Project?

Archaeological Field Methods

The survey conducted within the Project Area used two methods of sampling and testing to identify and evaluate cultural resources. The literature review did not indicate that any areas had been previously surveyed and there are no previously recorded sites in this area. Atlas review indicated that a residence was formerly located in the central part of the Project Area. Standard methods of survey and documentation are appropriate for the archaeological investigation of this area. These included surface collection and visual inspection.

Surface collection. This method was conducted throughout the Project Area. The conditions at the time of survey involved a soybean stubble field that offered greater than 80 percent bare ground surface visibility. One site was identified during this survey method and was located accordingly. The boundaries of this site were demarcated with a Trimble GeoXT global positioning system (GPS).

Visual inspection. Locations where cultural resources were not expected, such as disturbed areas and low/wet areas were walked over and visually inspected. This method was used to verify the absence or likelihood of any cultural resources being located in these areas. This method was also utilized to document the general terrain and the surrounding area and inspect the buildings and nature of the APE.

The application of the resulting field survey methods was documented in field notes and field maps.

Prehistoric Artifact Analysis

An artifact inventory was accomplished upon completion of the fieldwork. This involved identifying the functional attributes of individual artifacts, as well as the artifact cluster(s) or site assemblage collectively. The prehistoric artifact types and material were identified during the inventory process. The lithic artifact categories are modeled after Flenniken and Garrison (1975) and include the following:

Primary Thinning Flake. This flake type represents a transitional mode of chert reduction. The intent of this reduction activity is to reduce a core to a crude biface. Flakes have a steep platform angle (i.e., >65°) and lack cortex. However, occasional small remnants of cortex are prevalent at this point, especially on the striking platform.

Identification of the material type of individual artifacts is based on several attributes, including color, inclusions, and luster. Several resources were used to aid in the inventory of the material types, including Converse (1994), DeRegnaucourt and Georgiady (1998), and Stout and Schoenlaub (1945).

Curation

A letter regarding the disposition of the cultural materials identified and collected during survey for this project was sent to the developer. A return letter outlining the disposition of these materials had not been received at the time of this report. Notes and maps affiliated with this project will be maintained at Weller & Associates, Inc. files.

Literature Review

The literature review study area is defined as a 2 km (1.2 mile) radius from the center of the Project Area, which is standard for the State Historic Preservation Office

(SHPO). In conducting the literature review, the following resources were consulted at Ohio Historic Preservation Office (OHPO) and the State Library of Ohio:

1) *An Archaeological Atlas of Ohio* (Mills 1914);
2) OHPO United States Geological Survey (USGS) 7.5' series topographic maps;
3) Ohio Archaeological Inventory (OAI) files;
4) Ohio Historic Inventory (OHI) files;
5) NRHP files;
6) Determinations of Eligibility (DOE) files;
7) OHPO Cultural Resource Management (CRM)/contract archaeology files; and
8) Lucas County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s).

A review of the *Atlas* (Mills 1914) was conducted. There were no resources situated within or adjacent to the Project Area.

The OHPO topographic maps indicated that there are 26 previously recorded resources in the study radius (Table 2). There were two historic period sites identified in the field and nearby residence that are to the south and southwest of the current area of investigation. There were no resources identified within or adjacent to the project area.

Table 2. Previously recorded OAI forms filed within the 2 km study radius.

OAI #	Site Type	Temporal Affiliation
LU0528	Unknown	Late Archaic, Late Woodland
LU0529	Unknown	Early Woodland
LU0530	Unknown	Late Woodland
LU0531	Unknown	Unassigned Prehistoric
LU0532	Unknown	Unassigned Prehistoric
LU0533	Unknown	Unassigned Archaic
LU0534	Unknown	Unassigned Prehistoric
LU0535	Unknown	Late Archaic
LU0536	Unknown	Early Archaic
LU0549	Unknown	Unassigned Prehistoric
LU0550	Unknown	Unassigned Prehistoric
LU0551	Unknown	Unassigned Prehistoric
LU0558	Unknown/Historic	Unassigned Prehistoric/Historic
LU0559	Unknown	Unassigned Prehistoric
LU0560	Historic	Historic
LU0561	Historic	Historic
LU0562	Historic	Historic
LU0570	Unknown	Unassigned Prehistoric
LU0617	Unknown	Unassigned Prehistoric
LU0618	Unknown	Early Archaic
LU0619	Unknown	Unassigned Prehistoric
LU0620	Unknown	Unassigned Prehistoric
LU0621	Historic	Historic
LU0634	Historic	Historic
LU801	Historic	Scattered artifacts
LU802	Historic	Scattered artifacts

The OHI files did not indicate any previously recorded OHIs within the Project Area. Sites LUC0462810, LUC0025410, and LUC0462910 are located to the northwest/southwest of the Project Area and along Lallendorf Road. These resourced were recorded and evaluated during a previous CRM survey (Weller and Barrett 2012) and were determined not significant.

A review of the NRHP files and OHPO consensus DOE files was conducted. There were no NRHP properties or DOE resources located within the Project Area or its study radius.

A review of the CRM surveys was conducted for this Project. There were eight surveys conducted within the study radius (Hayfield and Rutter 2009; Gibbs and O'Donnell 1996; Dobson-Brown et al. 1994; Pratt 1980; Latham 2010; Weller 2013; Mustain et al. 1997; Weller & Barrett 2012). None of these surveys incorporate any aspects of the current Project Area; however, the Weller & Barrett survey (2012) was involved in the area that is immediately to the south and east of this tract. The Weller survey (2013) was conducted for an adjacent and related area, and did not result in the identification of any additional materials.

Cartographic/atlas resources were reviewed for the project. *An Illustrated Historical Atlas of Lucas and part of Wood Counties, Ohio* (Andreas & Baskin 1875) indicates that John Lallendorf was the property owner and there was one residence indicated within the central aspect of his parcel (Figure 4). This residence is indicated just north of the Project Area and is absent by the early twentieth century. The USGS *1900 Maumee Bay, Ohio Quadrangle 15 Minute Series (Topographic)* map does not indicate any residences on the project site; however, there are several oil wells indicated within the western part of the project site (Figure 5). A more recent topographic map (Figure 2) indicates that there are residences located along North Lallendorf Road; these are outside of the Project Area. A modern aerial indicates the aforementioned three structures along North Lallendorf Road as still being extant (Figure 3), as was confirmed through field reconnaissance.

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project site had been previously surveyed and, if so, what is the relationship of previously recorded properties to the project?
2) Are cultural resources likely to be identified in the project site?

The literature review indicated that a 19th century residence was once situated to the north of the Project and that there are residences to the far western part of the Project Area. There have been previous surveys conducted in the immediate vicinity and these did not result in the identification of any significant sites. Oil wells are noted within the surrounding area. The topography in the upland aspect of this region is very flat, which is reflective to this project. It is not well drained. It is considered unlikely prehistoric materials would be identified in this setting. Cultural materials are not expected.

Fieldwork Results

The field investigations for this project were conducted on May 29, 2014. The conditions of the Project Area at the time of survey included a single soybean stubble field. The weather during field survey efforts was warm and sunny with Fahrenheit temperatures in the 80s; therefore, weather was not a factor in the completion of the fieldwork. These investigations involved intensive surface collection methods and visual inspection. The field investigations resulted in the identification of one previously unrecorded archaeological site, 33LU0806.

The Project Area is a 3.0 ha (7.5 ac) rectangular-shaped parcel that is north of a spur of the Norfolk & Western Railroad tracks and is east of N. Lallendorf Road. There is a gravel mined area that was contained in scrub land and deciduous forestation is at the western edge of the Project Area. This is contained within a residential lot. Driftmeyer Ditch drains the area to the west and Johlin Ditch drains the area to the east.

Surface collection was conducted throughout the Project Area (Figures 6-9). The entire tract was dry and was contained in a soybean stubble field. The bare ground surface visibility within the field ranged from 80-100 percent and it was considered to be in excellent condition for the purposes of these investigations. Pedestrian transects were spaced at 5 m intervals through this area. These investigations identified a single prehistoric flake in the northeastern corner of the tract (Figure 6). The surrounding area was more intensively investigated to verify the singularity of the artifact. There were two meter tract intervals paced for an area of 10 m surrounding this artifact, but no additional materials were identified.

The terrain in this area, as well as the entirety of the Project Area, is very flat. Visual inspection confirmed the near absence of even the slightest landform elevations that might have been associated with any anticipated former Lallendorf residence (as depicted on the late nineteenth century atlas). The former house location was anticipated as being to the north of this project. The lack of any historic period materials supports this inference.

These investigations identified one archaeological site (33LU806). The following is a description of this resource.

Archaeological Site Description

33LU806

This site is an isolated prehistoric period artifact that was identified during surface collection of a soybean stubble field (Figure 6). The site is located to the east of Lallendorf Road and is north of the Norfolk & Western railroad tracks and future power plant. This is upland, flat Lake Plain terrain. The site is located on a very slight elevation that is consistent with Fulton soils versus the poorly drained Latty soils that account for the majority of the surrounding terrain. The artifact identified from this site was collected and plotted using a GPS system. This area is drained by Driftmeyer Ditch, which flows directly into Lake Erie. By definition, the site size for an isolated artifact in Ohio is regarded as being 1 sq m.

The artifact is a primary thinning flake of Pipe Creek chert. This is functionally indicative of core reduction activities. The artifact is not regarded as being temporally diagnostic.

This site was evaluated for its suitability for listing on the NRHP. Based on that evaluation, this site is considered to lack integrity and is not considered to be significant. The artifacts and their context are scattered throughout a plowzone and are lacking integrity regarding their specific temporal affinity and location. This site does not meet the necessary requirements to be regarded as eligible under any of the criteria (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45). No further work is considered to be necessary at this site.

Evaluations of Research Questions 3 & 4

There were two questions presented in the research design that will be addressed at this point. These are:

3) Will the planned undertaking affect any archaeological or architectural properties?
4) Will any NRHP eligible sites or properties be affected by the project?

The testing for this Project Area identified archaeological site 33LU806. This is a prehistoric period isolated find and is not regarded as being significant. No NRHP are considered to be impacted or affected as part of this project's construction.

APE Definition and NRHP Determination

The Area of Potential Effect (APE) is a term that must be applied and determined on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. The project involves the construction of a switchyard, which is to be a minor expansion onto a much larger and abutting power plant. The plant will be located to the immediate south of the current Project Area; this area was the subject of previous CRM investigations. The construction of a switchyard in juxtaposition to a power plant is not considered to be the type of construction that would be aberrant in this setting. There are many nearby radio towers and electric facilities along with industrial areas. The switchyard will be barely noticeable in this setting once the planned power plant is constructed.

Weller addressed the cultural resource, 33LU0806 that is contained within the footprint of the Project Area. As noted previously, this resource was not considered to be eligible for the NRHP and no further work was considered necessary. There are previously identified architectural resources to the west, but these were not found to be significant (Weller and Barrett 2012). A finding of no historic properties affected is deemed appropriate.

Recommendations

In May of 2014, Weller & Associates, Inc. (Weller) conducted Phase I Cultural Resource Management Investigations for an approximately 3.0 ha (7.5 ac) Switchyard Area in Oregon Township, Lucas County Ohio. These investigations involved surface collection and visual inspection. The work resulted in the identification of one previously unrecorded archaeological site, 33LU806. This prehistoric period isolated find lacks sufficient integrity to be regarded as significant. No further work is recommended for the archaeological site identified in the Project Area; it is not eligible for the NRHP. There were no buildings or structures involved in this project. The APE was considered and justified. This undertaking is not out of place in this setting and industrial environment. It is Weller's opinion that this undertaking will have no effect on any historic properties. If the agency is in agreement with these findings, then a recommendation of no further work is considered and "no historic properties affected" is appropriate.

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Figures

Figure 1. Political map of Ohio showing the approximate location of the project.

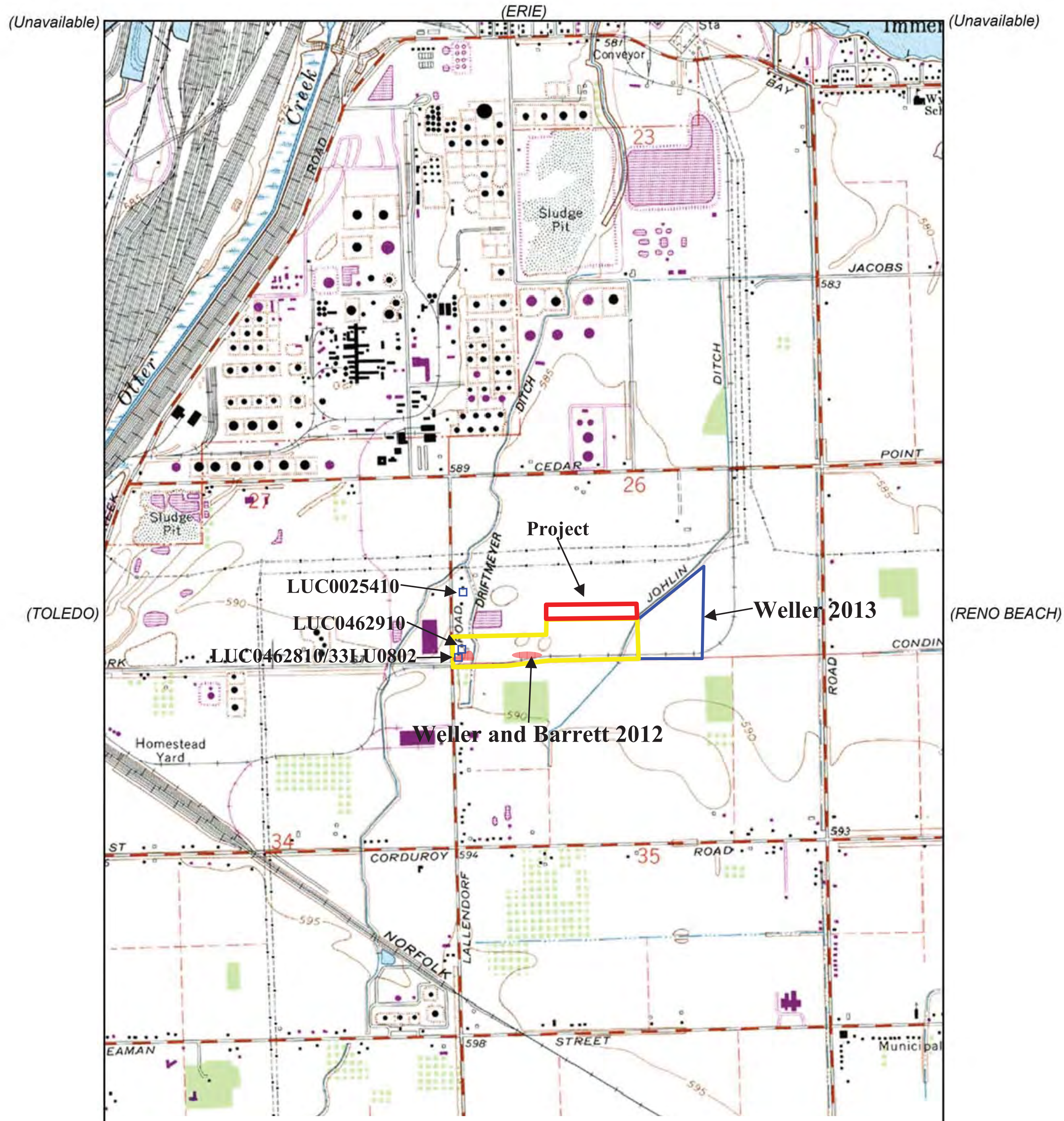

Figure 2. Portion of the USGS *1965 Oregon, Ohio Quadrangle 7.5 Minute Series (Topographic)* map indicating the location of the project and previously recorded resources in the vicinity.

(WALBRIDGE)

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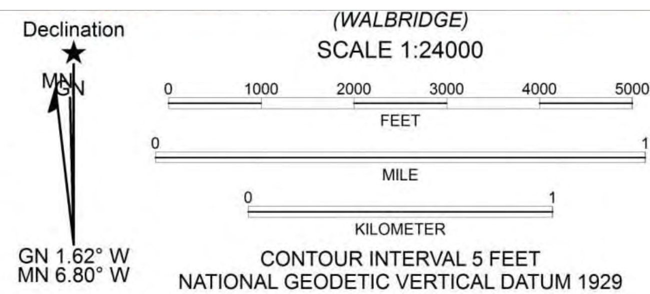

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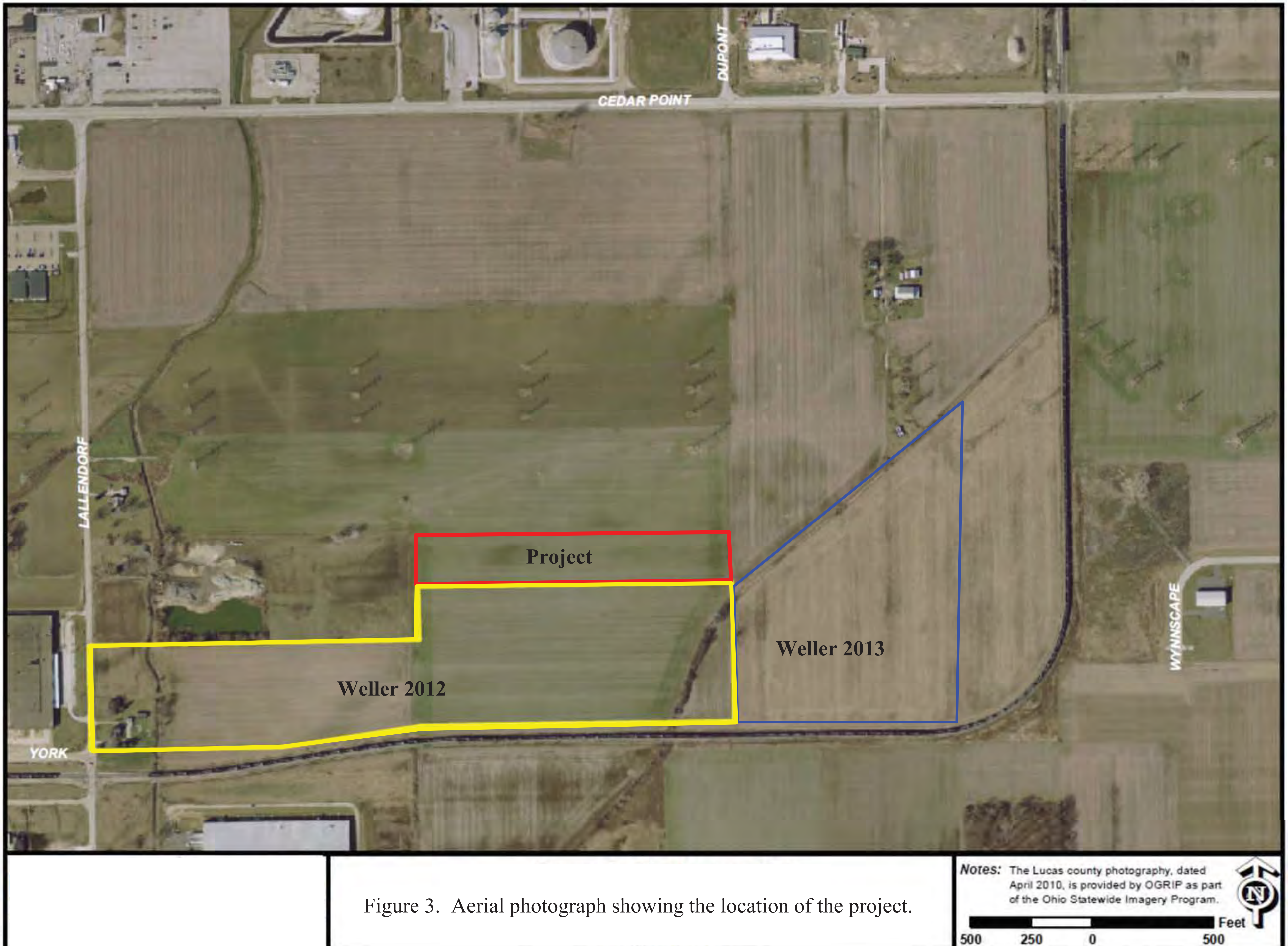


Figure 3. Aerial photograph showing the location of the project.

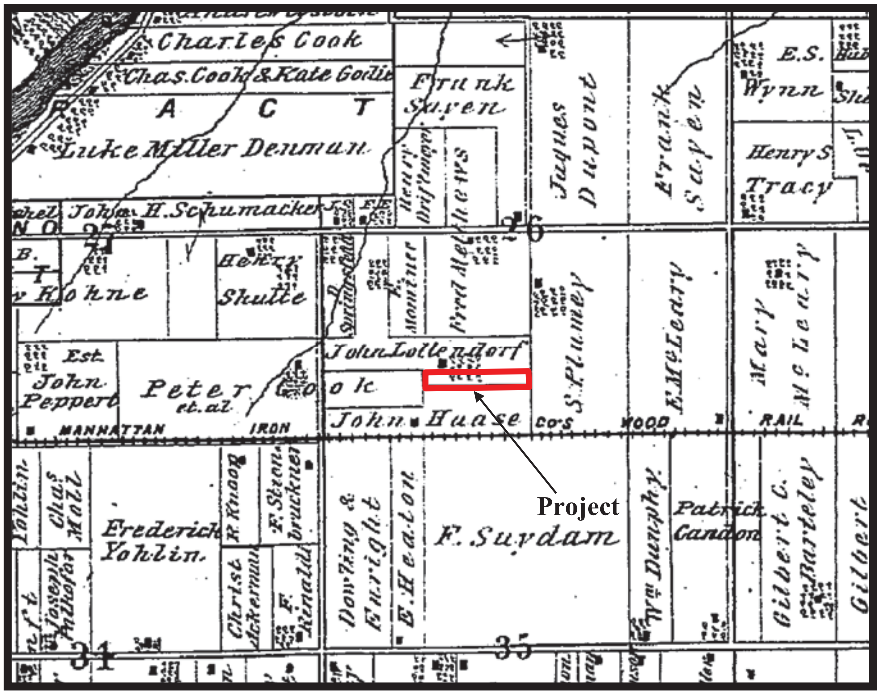


Figure 4. Portion of the *Illustrated Historical Atlas of Lucas and Part of Wood Counties, Ohio* (Andreas & Baskin 1875) showing the approximate location of the project area.

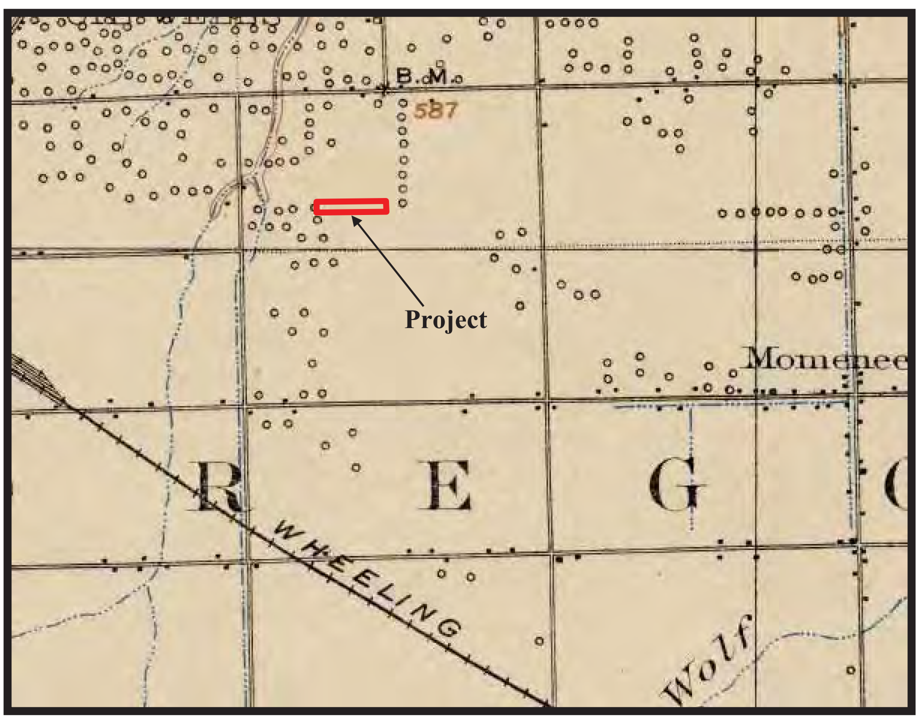
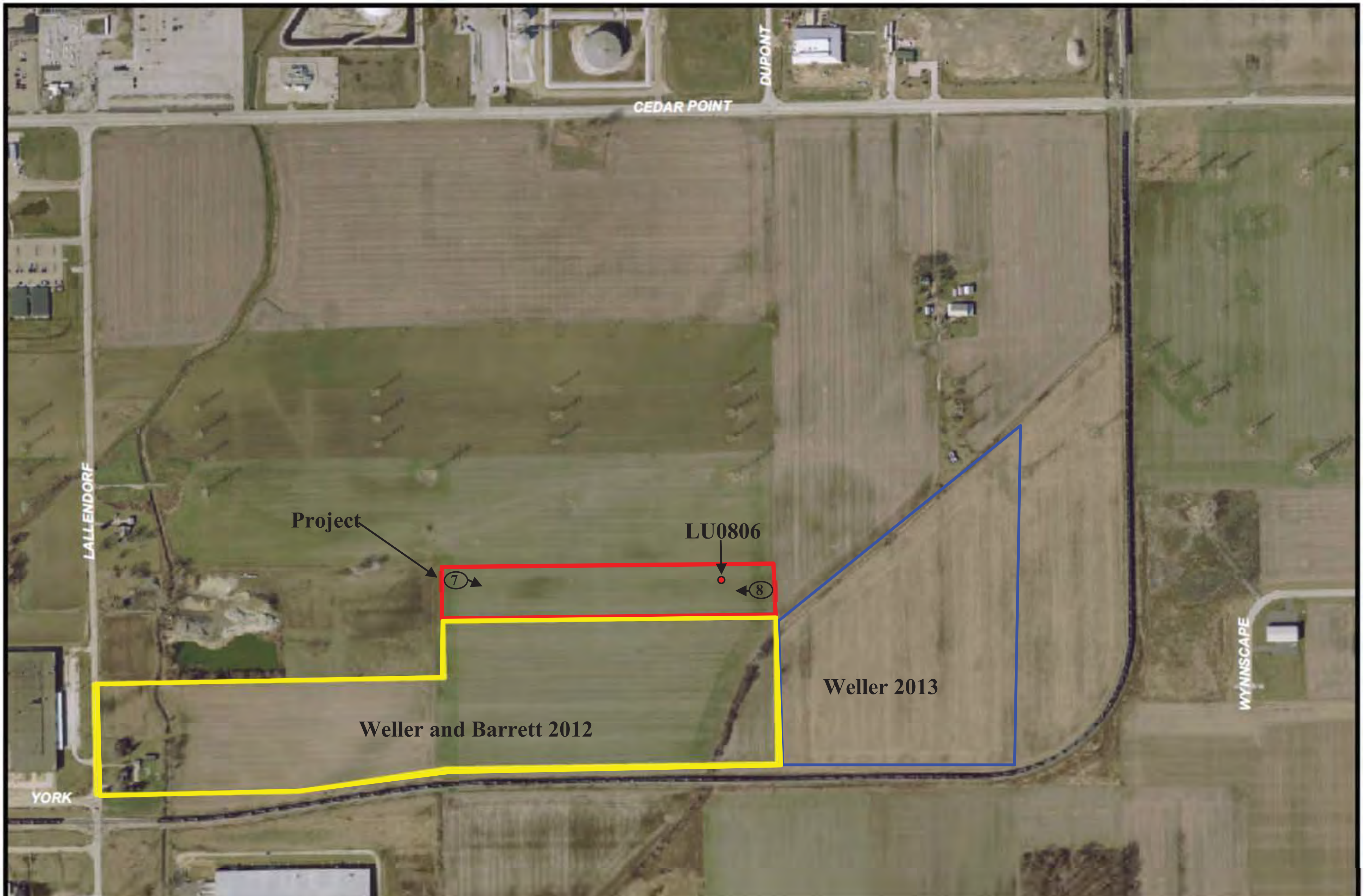


Figure 5. Portion of the *1900 Maumee Bay, Ohio Quadrangle 15 Minute Series (Topographic)* map showing the approximate location of the project area.



• Surface Collected Artifact Location
(XX) Photo Orientations

Figure 6. Fieldwork schematic depicting testing conducted, disturbance encountered, and photographic orientations.

Notes: The Lucas county photography, dated April 2010, is provided by OGRIP as part of the Ohio Statewide Imagery Program.

500 250 0 500 Feet

Figure 7. View of the conditions within the project.

Figure 8. Another view of the conditions within the project.

Figure 9. View of the surface visibility encountered within the project.

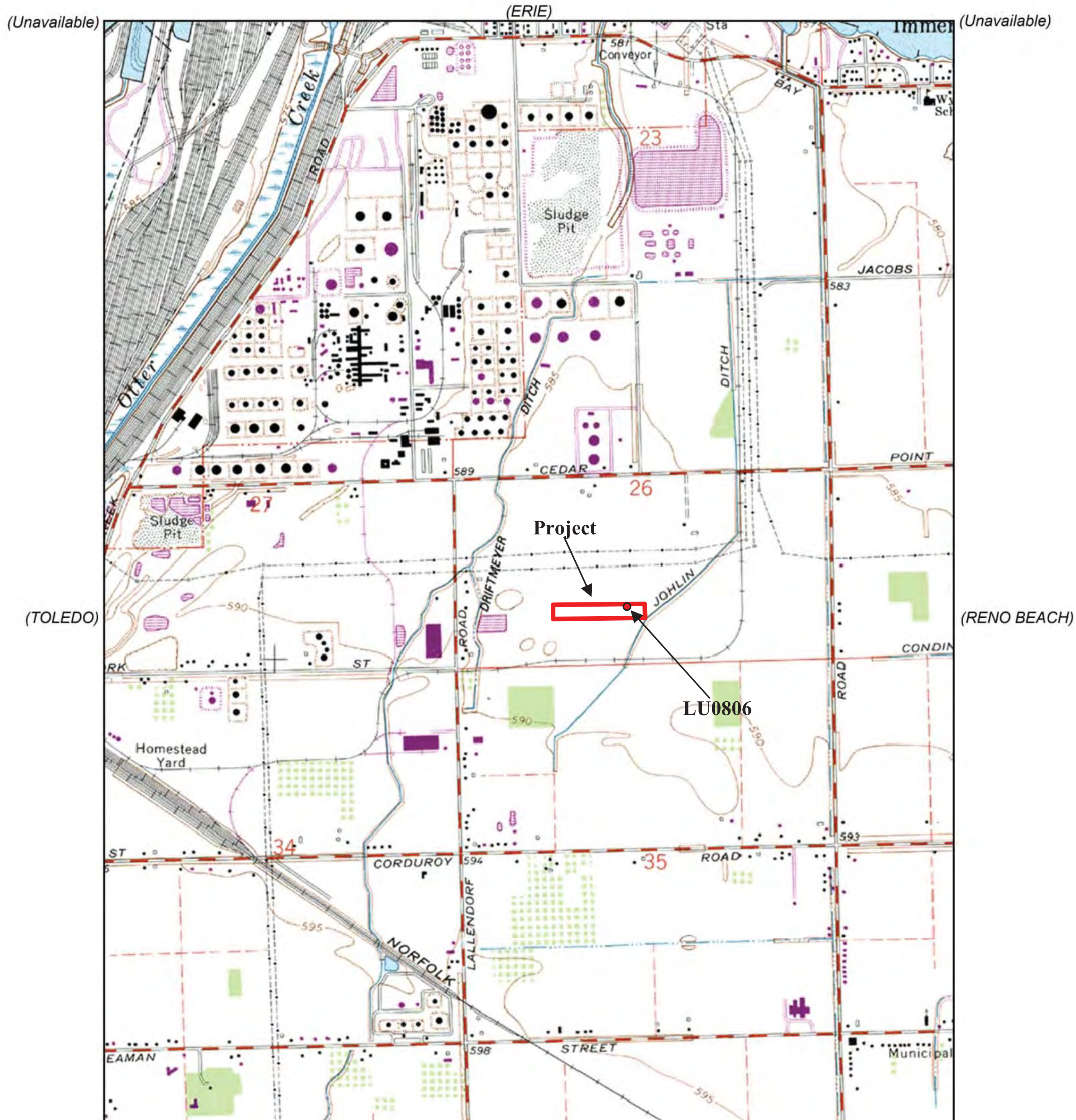
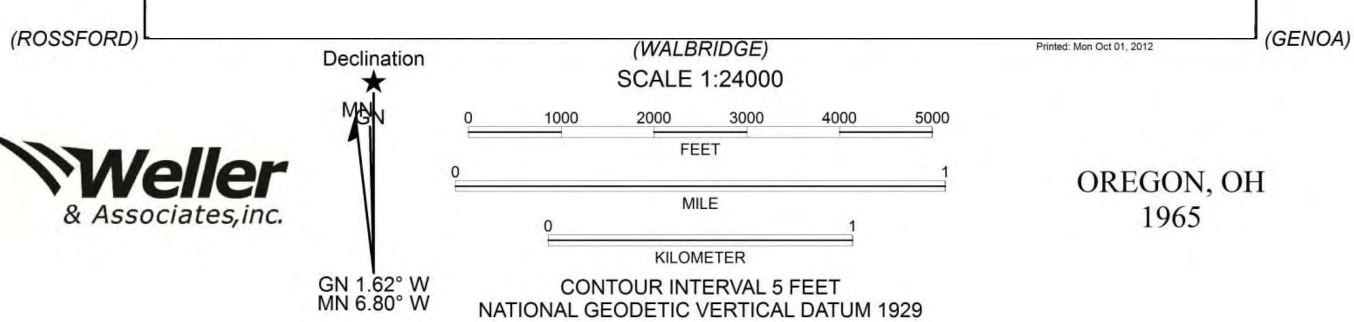


Figure 10. Portion of the USGS *1965 Oregon, Ohio Quadrangle 7.5 Minute Series (Topographic)* map indicating the location of Site LU0806.



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1965

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Summary: Application of Oregon Clean Energy, LLC for an Amendment to its Certificate of Environmental Compatibility and Public Need - Part 2 (Appendices) electronically filed by Teresa Orahood on behalf of Sally Bloomfield