

Section 1

Project Introduction

The Crawford Renewable Energy, LLC (CRE) project is a tire-derived-fuel (TDF) fired power generation facility that will be located at the Keystone Regional Industrial Park (off of Adamsville Road) in Greenwood Township, Crawford County, PA. The project is designed to generate up to 100 megawatts (MW) gross, 90 MW net of electrical power and will use circulating fluidized bed (CFB) boiler technology.

The TDF used in the plant will be delivered as waste tires to an on-site processing facility, where they will be processed and shredded. Approximately 900 tons per day of TDF will be required to operate the power plant. An adequate supply of TDF will be kept on-site to ensure continuous plant operation. CRE is in the process of negotiating agreements with various suppliers capable of providing the tires needed to operate the plant, and will also work with community groups to process tires generated through community generated clean-up efforts.

Tires will arrive on-site by either rail or truck. Rail cars will be unloaded indoors, while trucks will be unloaded outside of the tipping floor. It is anticipated that approximately 80% to 90% of the tires will be delivered by rail. Tires delivered by truck will be immediately moved indoors for processing. All TDF storage will be under roof and not subject to the elements. Tires will **not** be stored in outdoor tire piles.

The proposed plant will consist of two CFB steam generators operating in parallel, followed by post-combustion air pollution control systems that will control each unit prior to being exhausted into a single stack. Each air pollution control system will be equipped with state-of-the-art air pollution controls, including a TurboSorp® scrubber, fabric filter (baghouse) and a Regenerative Selective Catalytic Reduction system known as "RSCR." The entire air pollution control system for each unit will be provided by Babcock Power Environmental. Flue gases leaving each control system will be ducted to a single stack that will be approximately 325 feet high.

In addition to the CFB steam generators, the facility will have a totally-enclosed tire shredding and preparation area and material handling operations such as TDF conveyance, limestone, sand and lime storage and handling, anhydrous ammonia handling, and an ash handling. A firewater pump and a cooling tower will also be located at the facility. The cooling tower will be used for non-contact cooling water.

The facility is being proposed to operate 24 hours per day, 365 days per year with the exception of outages taken for maintenance purposes. The steam generated by the CFB units will be used to drive a single steam turbine to produce electricity for sale on the grid. Additionally, steam produced at the site is also being evaluated for possible other uses.

1.1 Background

CRE is a privately-held company comprised of Canton, MA-based majority partner Caletta Renewable Energy, LLC ("Caletta"), a developer of renewable energy plants in Massachusetts, Maryland and Rhode Island; and Erie-based Conservation Development Associates, LLC, which was formed to work with Caletta to develop this facility.

CRE is proposing to build this tire-to-energy facility in the existing Keystone Industrial Park on an approximate 80-acre parcel which is located off of Adamsville Road in Greenwood Township, Crawford County. The industrial park is currently a Keystone Opportunity Zone (KOZ).

The proposed Meadville Power Station plant will use CFB technology to combust TDF to produce temperatures in the CFB capable of generating steam to run a steam turbine which produces electricity.

The CFB technology is currently being used in more than 500 installations worldwide, more than 50% of which utilize the Foster-Wheeler technology, including three units permitted to operate on TDF in Japan. Four additional similar facilities are in various stages of permitting, development and construction in the U.S., Korea and Japan. The technology supplier selected for the CFB units is Sumitomo Heavy Industries (SHI). SHI has helped develop this technology in conjunction with Foster Wheeler, which is well known as a world-wide leader in CFB design and operation. The technology is capable of meeting the most stringent air quality regulations, and has been approved for operation in California. Test burns of TDF in waste coal facilities in Pennsylvania utilizing CFB technology have indicated that the technology will meet stringent Pennsylvania standards. Combustion of TDF has also been approved by PA DEP for use in an existing CFB located at the Northampton facility in the eastern part of the state. Test burns at the Northampton facility have also indicated that the unit can operate in compliance with all applicable air quality requirements. The technology selected for the CRE facility is next generation, and the control equipment is superior to existing facilities that currently meet the most stringent standards.

This application contains all of the information necessary to satisfy the Federal and State Permit and Plan Approval requirements. It includes general and technical information regarding the project, and identifies and analyzes all of the applicable Federal and State air pollution control regulations including:

- New Source Performance Standards (NSPS) 40 CFR Part 60.
 - 40 CFR Part 60 Subpart Da – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units - Although the CFB units in this application will not be combusting fossil fuels, PA DEP has determined in its draft review for the previously proposed Erie location that this sub-part applies to this facility.
 - 40 CFR Part 60 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units -It has been determined that this subpart does not apply because Da is applicable.
 - 40 CFR Part 60 Subpart HHHH – Emission guidelines and Compliance Times for Coal-Fired Electric Generating Units - This subpart is not applicable because the facility will not be coal-fired.
 - 40 CFR Part 60 Subpart CCCC – Standards of Performance for Commercial and Industrial Solid Waste Incineration Units for Which Construction is Commenced After November 30, 1999 or for Which Modification or Reconstruction is commenced on or After June 1, 2001 – This subpart has been vacated by the federal courts and is currently not applicable. On April 29, 2010, EPA published draft requirements which identified TDF as a non-hazardous material that is a solid waste. If this rule is finalized the proposed unit may be subject to the CISWI requirements and not 40 CFR Part 60 Subpart Da. In any event, the proposed station will meet the requirements because of the technology selected.
 - 40 CFR Part 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines – This Section will apply to the Stationary Fire Pump that is being proposed for this facility.
- 40 CFR Part 63 – National Emission Standards for Hazardous Air Pollutants
 - 40 CFR Part 63 Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, Institutional Boilers and Process Heaters – This Section has been vacated by the Federal courts and therefore does not apply. On April 29, 2010, EPA proposed new requirements for the boiler MACT for both major and area sources. The proposed facility is not a major source for Hazardous Air Pollutants (HAPs), with total HAP emissions less than 25tpy and no individual HAP greater than 10tpy. Depending on how the facility is defined it may be subject to the area source MACT rule for boilers. If subject to the CISWI rule it is unlikely that these provisions will apply. In any event the facility will meet the proposed area source requirements.
- Acid Rain Regulations (Title IV Program) – These regulations do not apply because the facility will not combust a fossil fuel.

- Clean Air Interstate Rule (CAIR) – This regulation, which was developed to further control SO₂ and NO_x, may apply to this facility. In its draft approval for the previously proposed Erie facility, DEP indicated that these requirements do apply. With the proposed rulemaking a re-evaluation may be necessary.
- PSD Requirements 40 CFR Part 52.21
- Non-attainment NSR 40 CFR Part 52
- PA DEP 25 PA Code, specifically Chapters 127 and 145
 - Chapter 127 – Plan Approval and Permit Requirements
 - Chapter 145 – Interstate Pollution Transport Reduction, which will be replaced by the PA Clean Air Interstate Rule (CAIR)
 - PA DEP General Requirements
 - PA DEP Site level Requirements

The approach taken in this application to demonstrate that both Federal and State requirements are being met is very conservative. Values selected for emission rates are based on best projections and assumptions used in the air quality modeling analysis. Additionally, emission rates were selected to identify worst-case conditions. The air pollution control system selected for this project is believed to be the best available and will operate cleaner than what is being projected.

CRE is committed to achieve the stringent emission limitations listed in this report as:

- Best Available Control Technology (BACT)
- Lowest Achievable Emission Rate (LAER)
- PA Best Available Technology (BAT)

CRE's proposals for BACT, LAER and BAT will meet and in most cases exceed all applicable requirements. While the BAT evaluation is technology-based, the determinations for BACT and LAER are emission rate-based determinations. The actual operating emission rates and resultant air quality impacts will most likely be lower than those presented due to the conservative nature of the assumptions made in this analysis.

1.2 Report Organization

The remainder of this application is organized as follows:

- Section 2 – Project Description - This Section presents site information, physical plant lay-out description, air pollution emission controls, general plans and specifications for the proposed project, and a description of the material handling systems.
- Section 3 – Emission Inventory - This section provides estimated air emissions from the proposed CFB units, fuel handling, limestone handling, byproducts or ash handling, and ancillary facility operations.
- Section 4 – Review of Applicable Requirements - This Section discusses all relevant Federal and State Air Quality regulations for a new major stationary source and presents regulatory analysis.
- Section 5 – BACT, BAT, LAER Determinations - This Section discusses proposed control options for particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, VOCs and other PSD pollutants. The selected technology for each process is also chosen and discussed.
- Section 6 – Plan Approval Applications (CFB units and Processes)
- Section 7 – Modeling Protocol and Determinations
- Section 8 – Modeling Analysis and Air Quality Impact Analysis – This Section will address and present the air dispersion modeling required for the submittal of the application. Additional modeling as requested by PA DEP is also explained.

- Section 9 – Non-Attainment NSR Analysis – This Section outlines various determinations made in conjunction with 25 Pa. Code Chapter 127, Subchapter E and also includes the required Alternate Site Analysis.
- Section 10 – Clean Air Interstate Rule (CAIR) and NOx Budget Analysis – Since the primary purpose of this facility is to generate electricity and because each CFB unit will have a capacity greater than 25 MW, this project may and most likely will be subject to the proposed PA CAIR requirements that will replace the NOx Budget Trading Program in 25 Pa. Code Chapter 145. Additionally, on July 6, 2010, EPA proposed a CAIR Replacement Rule to be known as the Transport Rule that will require deeper and faster cuts in NO_x and SO₂ emissions in a 31 state transport area. CRE will work with PA DEP on applicability and specifics that will meet the applicable standards for when the plant becomes operational. Because of the control technology chosen for this project, CRE's process is designed to meet emission requirements. The company will work with PA DEP on the credit issue.
- Appendix A – General Information Form (GIF) – This form is required for all DEP Applications.
- Appendix B – Municipal Notifications – Notifications are required to satisfy the provisions in 25 Pa. Code Section 127.43a as required by section 1905-A of The Administrative Code of 1929(71 P.S. § 510-5)
- Appendix C – Compliance History Form – This form is required with all Air Quality Plan Approval Applications. This will be the initial filing for CRE.
- Appendix D – Miscellaneous Information (BACT Determinations, Product Literature, particle size information, FLM response, etc.)
- Appendix E – Maps and Drawings

1.3 Summary

The proposed CRE facility will meet all applicable Federal and State Air Quality requirements. The proposed facility may be subject to:

- 40 CFR Part 60 NSPS Subpart Da, Electric Utility Steam Generating Units (may not be applicable, but requirements will be met)
- 40 CFR Part 60 Subpart CCCC, CISWI (vacated and therefore not applicable, but addressed in Section 4, proposed on April 29, 2010, and may be applicable to this facility, and emission limitations will be met)
- 40 CFR Part 63 Subpart DDDDD (vacated and therefore not applicable but previous requirements will be met; may be subject to provisions in the April 29, 2010 proposal when finalized)
- 40 CFR Part 52.21, PSD regulations as adopted in 25 Pa. Code Chapter 127, Subchapter D
- 40 CFR Part 98 – Mandatory Greenhouse Gas Reporting, Subpart D – Electricity Generation
- 25 Pa. Code Chapter 127, Subchapter E, New Source Review
- 25 Pa. Code Chapter 127, Subchapter G, Title V Operating Permit provisions
- 25 Pa. Code Chapter 127, Subsection 127.531 relating to Acid Rain Provisions and Title IV of the CAA (if applicable)
- 25 Pa. Code Chapter 145, Interstate Pollution Transport Reduction (if applicable)
- Other pertinent PA AQ regulation in 25 Pa. Code Title 25 that will be General or Site Level Requirements.

Compliance with these regulations will be achieved through the use of BACT, LAER and BAT as applicable. The following emission limitations are being proposed for the CFB:

**Table 1-1
CFB Emissions**

Emission	Lbs./MM BTU	Lbs./hr.	TPY (unless spec.)	% Removal
PM/PM 10 (Particulate matter)	.02	21.0	91.98	99.5
PM 2.5	0.01	10.5	45.99	99+
SO ₂ 24 hr. Rolling	0.031	32.55	142.57	99.5
NO _x lbs./hr. (max) 24 Hr. Rolling	0.055	57.75	252.95	70 (from base case)
CO	0.15	157.5	689.85	
Pb	7.16 x 10 ⁻⁶	0.0075	65.31lbs.	
VOC (non-methane)	0.006	6.3	27.59	
Stack Opacity				10 % < 3min./hr 30% Max.
NH ₃ Slip	10 ppm			
HCl	0.002	2.1	9.19	
H ₂ SO ₄	0.002	2.1	9.19	
Mercury	3.3 x 10 ⁻⁷	3.45 x 10 ⁻⁴	3.0lbs.	98+

Other CFB emissions are explained in the Emission Inventory Section

Emissions from other sources at the facility are estimated in Table 1-2 and 1.2a below:

**Table 1-2
Emissions from Other Plant Sources
Particulate Matter**

Pollutant	Emission Limit	Operating Level	Operating Factor	Emissions lbs/hr	Emissions tpy
Cooling Tower					
PM-10	1.55lbs/hr		8760hrs/yr	1.55lbs/hr	6.79
PM- 2.5	1.55lbs/hr		8760hrs/yr	1.55lbs/hr	6.79
Limestone Silo #1					
PM-10	0.005gr/dscf	4200cf	Once/day	0.000	0.000
PM- 2.5	Not applicable	4200cf	Once/day	0.000	0.000
Limestone Silo #2					
PM-10	0.005gr/dscf	4200cf	Once/day	0.000	0.000
PM- 2.5	Not applicable	4200cf	Once/day	0.000	0.000
Sand Silo #1					
PM-10	0.005gr/dscf	1500cf	Once/day	0.000	0.0000

PM- 2.5	0.000gr/dscf	1500cf	Once/day	0.000	0.000
Sand Silo #2					
PM-10	0.005gr/dscf	1500cf	Once/day	0.000	0.000
PM-2.5	0.000gr/dscf	1500cf	Once/day	0.000	0.000
Hydrated Lime Silo #1					
PM-10	0.005gr/dscf	750cf	Once/day	0.000535	0.0000975
PM- 2.5	0.00375gr/dscf	750cf	Once/day	0.00040	0.000074
Hydrated Lime Silo #2					
PM-10	0.005gr/dscf	750cf	Once/day	0.000535	0.0000975
PM- 2.5	0.00375gr/dscf	750cf	Once/day	0.00040	0.000074
Fly Ash Silo					
PM-10	0.005gr/dscf	1500cf	8760hrs/yr	0.064	0.282
PM- 2.5	0.00375gr/dscf	1500cf	8760hrs/yr	0.048	0.211
Bottom Ash Silo #1					
PM-10	0.005gr/dscf	212cfm	8760hrs/yr	0.0091	0.040
PM- 2.5	0.000gr/dscf	212cfm	8760hrs/yr	0.0000	0.000
Bottom Ash Silo #2					
PM-10	0.005gr/dscf	212cfm	8760hrs/yr	0.0091	0.040
PM- 2.5	0.000gr/dscf	212cfm	8760hrs/yr	0.0000	0.000
Paved Roadways (Passenger Cars)					
PM-10				See Section 3 for specifics	
PM- 2.5				See Section 3 for specifics	
Paved Roadways (Trucks)					
PM-10				See Section 3 for specifics	
PM- 2.5				See Section 3 for specifics	

Please note: The Handbook of Chemistry and Physics shows that particle size of fine sand is >20microns, ground limestone is > 10microns, fly ash is >1micron, assume bottom ash is > 2.5microns. Because of this only PM emissions were estimated from the sand and limestone operations. Additionally no PM-2.5 emissions were estimated from the bottom ash silos. PM-10 and PM-2.5 emissions were estimated from all other material handling operations. Because of this

Table 1.2a
Other Sources

Source	PM 10		SO ₂		NO _x		CO		VOC	
	Lbs./hr	tpy	Lbs./hr	tpy	Lbs./hr	tpy	Lbs./hr	tpy	Lbs./hr	tpy
Fire Water Pump	0.55	0.005	0.51	0.0	1.8	0.02	1.35	0.01	0.625	0.006
Totals	2.234	7.25	0.51	0.0	1.8	0.02	1.35	0.01	0.625	0.006

A summary of the air pollutants to be emitted from the proposed CRE facility in relationship to PSD increments is presented in Table 1-3.

Table 1-3
Emissions compared to PSD Significant Levels

Criteria Pollutant	Significance Level tpy	Projected ERE Emission tpy
PM-10	15	99.26

PM-2.5	10	53.01
SO ₂	40	142.97
NO _x	40	252.97
CO	100	689.86
VOCs	40	27.60
Pb	0.6	0.033

Due to the equipment and control devices selected for this application, the increase in ambient concentrations attributable to the proposed CRE facility for PM-10, PM-2.5 (all proposed SILs), CO, Nitrogen Dioxide (NO₂), and Sulfur Dioxide (SO₂) will not exceed the allowable PSD modeling significant levels. Because of these low emissions and minor impacts, PSD regulations do not require the modeling of other sources. It should also be noted that no SILs have yet been established for the new 1-hour NO₂ and SO₂ ambient air quality standards. In any event we have looked for possible increment consuming sources in Ohio and New York within a 50 km distance of this facility and have determined that there are none. Because this facility is below the modeling significant level, increment consumption is not applicable in this application. See Table 1-4.

**Table 1-4
Modeling Impacts**

Pollutant	Avg. Period	NAAQS ug/m ³	CRE Impact ug/m ³	PSD Increment	% Of Increment	Modeling Sig. Level ug/m ³	% of Sig. Level
PM-10	Annual	50	n/a	17	n/a	1	56.9
	24-hour	150	n/a	30	n/a	5	89.2
PM-2.5	Annual	15		4.5		0.3 (lowest prop.)	34.5
	24-hour	35		9		1.2 (lowest prop.)	75.6
SO ₂	Annual	80	n/a	20	n/a	1	8.7
	24-hour	365	n/a	91	n/a	5	29.2
	3-hour	1300	n/a	512	n/a	25	15.7
	1-hour	75ppm				7.9(proposed)	59.4
NO ₂	Annual	100	n/a	25	n/a	1	24.4
	One Hour	100ppb				7.5	97.6 (fire pump)
CO	1-hour	40,000		-	-	2,000	2.4 (start)
	8-hour	10,000		-	-	500	2.4

The air quality impact analysis indicates that emissions from the proposed CRE facility will not cause or significantly contribute to pollutant concentrations that will exceed the primary or secondary National Ambient Air Quality Standards (NAAQS) or the Commonwealth of Pennsylvania's Ambient Air Quality Standards.

Because of the facility's location in the Ozone Transport Region (OTR) NO_x emissions from the facility will be offset at a 1.15:1 ratio as required in 25 Pa. Code Chapter 127 Subchapter E for non-attainment New

Source Review. In addition, because total VOC emissions are less than 50 tpy, they are not required to be offset.

As guided by PA DEP, CRE has advised the Federal Land Managers (FLMs) about the project. The National Park Service and the National Forest Service (8/10/10) have concluded that the project will not be subject to a Class 1 review..