Bloomenergy™

October 23, 2018

Mr. David Fees
Acting Division Director
Division of Air Quality
Delaware Department of Natural Resources and Environmental Control
State Street Commons
100 West Water Street
Suite 6A
Dover, Delaware 19904

Subject: **Diamond State Generation Partners, LLC**
Red Lion Project – 24.9 MW Fuel Cells
Existing Permit: APC-2012/0013
Maintenance Upgrade Stationary Sources

Dear Mr. Fees:

Diamond State Generation Partners, LLC is proposing to perform a maintenance upgrade to the existing installation at the Brookside site with the most current generation of Bloom Energy servers and submits enclosed application. The upgraded Energy Servers will result in lowering all emissions including NO_x, CO, VOCs and CO_2.

The proposed maintenance upgrade will substitute 134 Bloom Energy 200kW ES-5700 servers totaling to 26.8MW and associated power electronics currently at the site with a combination of 52 Bloom Energy's current generation 200kW ES5-BABAAA servers with 250kW ES5-AACAAA servers totaling to 24.9MW. 24 pads will remain empty after the upgrade. The following table highlights the reductions in overall emissions due to the upgrade.

	Existing ES-5700 Server lbs/MWh	New ES5 (200kW or 250kW) Server lbs/MWh	% Reduction
NOx	0.0021	0.0017	**19.0%**
CO	0.100	0.034	**66.0%**
VOC	0.020	0.016	**20.5%**
CO_2	773.0	700.0	**9.4%**

As part of the application we are attaching the following documents for your review and approval.

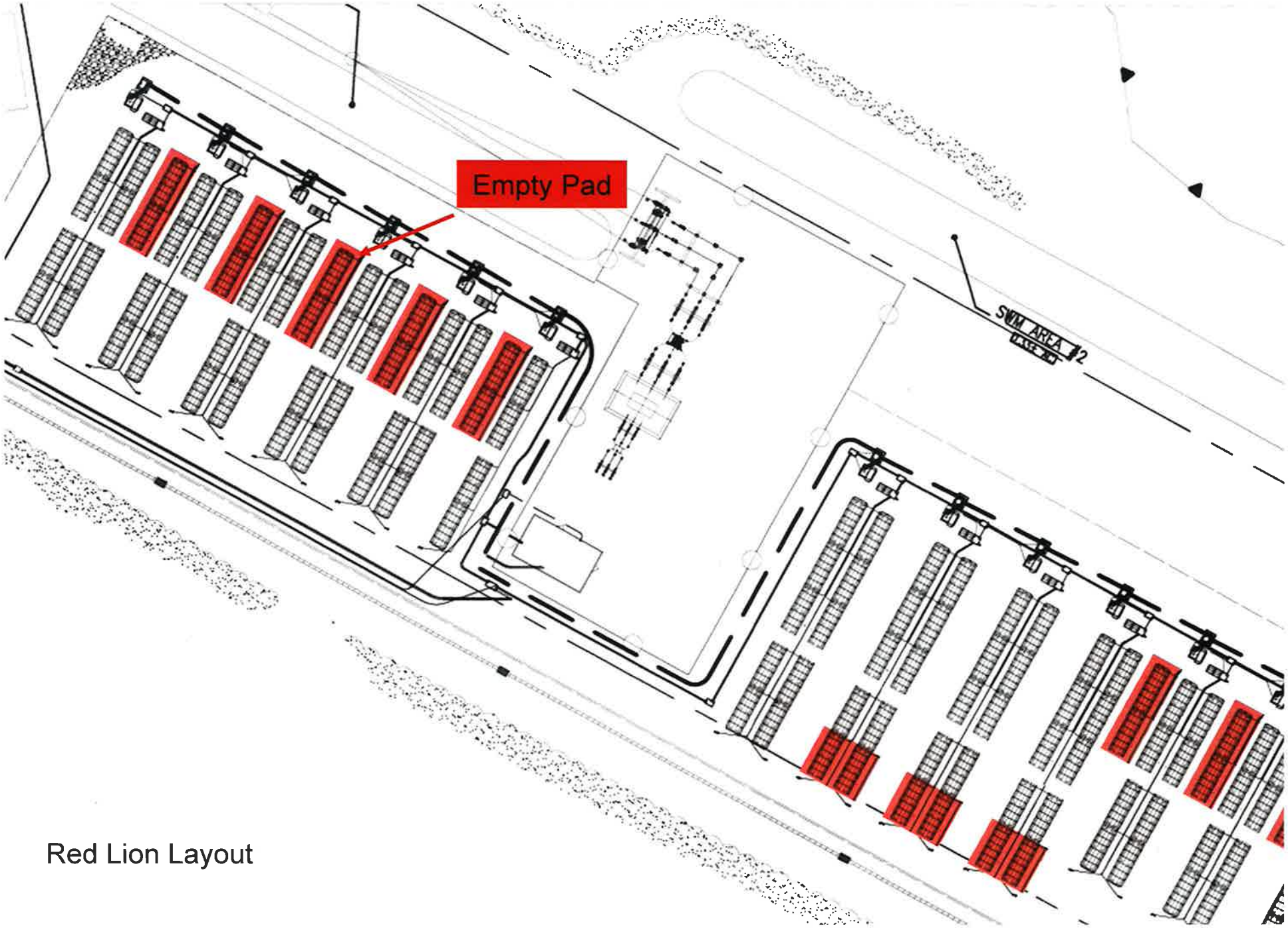
- Site Layout indicating which Bloom Energy servers are replaced
- ES5 – 200kW & 250kW Datasheets
- CARB emission test results
- AQM-1; Administrative Information
- AQM-2; Process Flow Diagram
- AQM-3.1; Generic Process Equipment Application
- AQM-5; Emissions Information Application
- AQM-6; Air Emission Modeling Application
- 1hr CO and NOx AERSCREEN Modeling results
- Red Lion Coastal Permit issued in 2012

Thank you for your consideration. Please let me know if you have any questions.

Sincerely,

Mark Mesler
Vice President
Diamond State Generation Partners, LLC

Attachment I
Site Layout Drawing



Red Lion Layout

Attachment II
Bloom Energy ES5 200kW & ES5 250kW Fuel Cell Data Sheets

Bloomenergy®

Energy Server 5

Clean, Reliable, Affordable Energy

CLEAN, RELIABLE POWER ON DEMAND

Bloom Energy's Energy Server 5 delivers clean power that reduces emissions and energy costs. The modular architecture enables the installation to be tailored to the actual electricity demand, with a flexibility to add servers as the load increases. The Energy Server 5 actively communicates with Bloom Energy's network operations centers so system performance can be monitored and maintained 24 hours per day, 365 days per year.

INNOVATIVE TECHNOLOGY

Utilizing patented solid oxide fuel cell (SOFC) technology, the Energy Server 5 produces combustion-free power at unprecedented efficiencies, meaning it consumes less fuel and produces less CO_2 than competing technologies. Additionally, no water is needed under normal operating conditions.

ALL-ELECTRIC POWER

The Energy Server 5, which operates at a very high electrical efficiency, eliminates the need for complicated and costly CHP systems. Combining the standard electrical and fuel connections along with compact footprint and sleek design, the Energy Server 5 is the most deployable fuel cell on the market.

CONTROLLED AND PREDICTABLE COST

By providing efficient on-site power generation, the economic and environmental benefits are central to the Energy Server 5 value proposition. Bloom Energy customers can lock in their long term energy costs and mitigate the risk of electricity rate increases. The Energy Server 5 has been designed in compliance with a variety of safety standards and is backed by a comprehensive warranty.

About Bloom Energy

Bloom Energy is making clean, reliable energy affordable. Our unique on-site power generation systems utilize an innovative fuel cell technology with roots in NASA's Mars program. By leveraging breakthrough advances in materials science, Bloom Energy systems are among the most efficient energy generators, providing for significantly reduced operating costs and dramatically lower greenhouse gas emissions. Bloom Energy Servers are currently producing power for many Fortune 500 companies including Apple, Google, Walmart, AT&T, eBay, Staples, as well as notable non-profit organizations such as Caltech and Kaiser Permanente.

Headquarters:
Sunnyvale, California

For More Information:
www.bloomenergy.com

Energy Server 5

Technical Highlights (ES5-BABAAA)	
Outputs	
Nameplate power output (net AC)	210 kW
Base load output (net AC)	200 kW
Electrical connection	480 V, 3-phase, 60 Hz
Inputs	
Fuels	Natural gas, directed biogas
Input fuel pressure	10-18 psig (15 psig nominal)
Water	None during normal operation
Efficiency	
Cumulative electrical efficiency (LHV net AC)*	65-53%
Heat rate (HHV)	5,811-7,127 Btu/kWh
Emissions	
NOx	< 0.01 lbs/MWh
SOx	Negligible
CO	< 0.05 lbs/MWh
VOCs	< 0.02 lbs/MWh
CO_2 @ stated efficiency	679-833 lbs/MWh on natural gas; carbon neutral on directed biogas
Physical Attributes and Environment	
Weight	12.6 tons
Dimensions (variable layouts)	14' 9" x 8' 8" x 7' 0" or 25' 9" x 4' 5" x 7' 5"
Temperature range	-20° to 45° C
Humidity	0% - 100%
Seismic vibration	IBC site class D
Location	Outdoor
Noise	< 70 dBA @ 6 feet
Codes and Standards	
Complies with Rule 21 interconnection and IEEE1547 standards	
Exempt from CA Air District permitting; meets stringent CARB 2007 emissions standards	
An Energy Server is a Stationary Fuel Cell Power System. It is Listed by Underwriters Laboratories, Inc. (UL) as a 'Stationary Fuel Cell Power System' to ANSI/CSA FC1-2014 under UL Category IRGZ and UL File Number MH45102.	
Additional Notes	
Access to a secure website to monitor system performance & environmental benefits	
Remotely managed and monitored by Bloom Energy	
Capable of emergency stop based on input from the site	

* 65% LHV efficiency verified by ASME PTC 50 Fuel Cell Power Systems Performance Test

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Bloom Energy Corporation
1299 Orleans Drive
Sunnyvale CA 94089
T 408 543 1500
www.bloomenergy.com

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Energy Server 5

Clean, Reliable, Affordable Energy

CLEAN, RELIABLE POWER ON DEMAND

The Energy Server 5 delivers clean power that reduces emissions and energy costs. The modular architecture enables the installation to be tailored to the actual electricity demand, with a flexibility to add servers as the load increases. The Energy Server 5 actively communicates with Bloom Energy's network operations centers so system performance can be monitored 24 hours per day, 365 days per year.

INNOVATIVE TECHNOLOGY

Utilizing solid oxide fuel cell (SOFC) technology first developed for NASA's Mars program, the Energy Server 5 produces clean power at unprecedented efficiencies, meaning it consumes less fuel and produces less CO_2 than competing technologies. Additionally, no water is needed under normal operating conditions.

ALL-ELECTRIC POWER

The Energy Server 5, which operates at a very high electrical efficiency, eliminates the need for complicated and costly CHP systems. Combining the standard electrical and fuel connections along with a small footprint and sleek design, the Energy Server 5 is the most deployable fuel cell solution on the market.

CONTROLLED AND PREDICTABLE COST

By providing efficient on-site power generation, the economic and environmental benefits are central to the Energy Server 5 value proposition. Bloom Energy customers can lock in their long term energy costs and mitigate the risk of electricity rate increases. The Energy Server 5 has been designed in compliance with a variety of safety standards and is backed by a comprehensive warranty.

About Bloom Energy

Bloom Energy is making clean, reliable energy affordable. Our unique on-site power generation systems utilize an innovative fuel cell technology with roots in NASA's Mars program. By leveraging breakthrough advances in materials science, Bloom Energy systems are among the most efficient energy generators, providing for significantly reduced operating costs and dramatically lower greenhouse gas emissions. Bloom Energy Servers are currently producing power for many Fortune 500 companies including Apple, Google, NSA, Walmart, AT&T, eBay, Staples, as well as notable non-profit organizations such as Caltech and Kaiser Permanente.

Headquarters:
Sunnyvale, California

For More Information:
www.bloomenergy.com

Energy Server 5

Technical Highlights (ES5-AA2AAA)	
Outputs	
Nameplate power output (net AC)	262.5 kW
Base load output (net AC)	250 kW
Electrical connection	480 V, 3-phase, 60 Hz
Inputs	
Fuels	Natural gas, directed biogas
Input fuel pressure	10-18 psig (15 psig nominal)
Water	None during normal operation
Efficiency	
Cumulative electrical efficiency (LHV net AC)*	65-53%
Heat rate (HHV)	5,811-7,127 Btu/kWh
Emissions	
NOx	< 0.01 lbs/MWh
SOx	Negligible
CO	< 0.05 lbs/MWh
VOCs	< 0.02 lbs/MWh
CO_2 @ stated efficiency	679-833 lbs/MWh on natural gas; carbon neutral on directed biogas
Physical Attributes and Environment	
Weight	13.6 tons
Dimensions (variable layouts)	14' 9" x 8' 8" x 7' 0" or 29' 4" x 4' 5" x 7' 5"
Temperature range	-20° to 45° C
Humidity	0% - 100%
Seismic vibration	IBC site class D
Location	Outdoor
Noise	< 70 dBA @ 6 feet
Codes and Standards	
Complies with Rule 21 interconnection and IEEE1547 standards	
Exempt from CA Air District permitting; meets stringent CARB 2007 emissions standards	
An Energy Server is a Stationary Fuel Cell Power System. It is Listed by Underwriters Laboratories, Inc. (UL) as a 'Stationary Fuel Cell Power System' to ANSI/CSA FC1-2014 under UL Category IRGZ and UL File Number MH45102.	
Additional Notes	
Access to a secure website to monitor system performance & environmental benefits	
Remotely managed and monitored by Bloom Energy	
Capable of emergency stop based on input from the site	

* 65% LHV efficiency verified by ASME PTC 50 Fuel Cell Power Systems Performance Test

Bloomenergy®

Bloom Energy Corporation
1299 Orleans Drive
Sunnyvale CA 94089
T 408 543 1500
www.bloomenergy.com

Attachment III
CARB Test Results

TABLE 6-1
EMISSION TEST RESULTS
BLOOM ENERGY
SYSTEM 5.0 POWER MODULE

Parameter	Run 1	Run 2	Run 3	Averages
Date:	11/5/14	11/5/14	11/5/14	--
Time:	0038-0138	0149-0249	0259-0359	--
Process Data:				
Cell Power Output, kW	60.39	60.24	60.37	60.33
Flue Gas:				
O_2, % volume dry	15.95	15.97	15.99	15.97
CO_2, % volume dry	2.810	2.812	2.806	2.809
Moisture Content, % volume	7.90	7.90	7.90	7.90
Stack Gas Velocity, dscfm	125.8	120.6	125.8	124.0
CO Emissions:				
ppmvd	3.90	3.83	3.77	3.83
lb/hr	0.0021	0.0020	0.0021	0.0021
lb/MW-hr	0.035	0.033	0.034	0.034
NO_X Emissions:				
ppmvd	0.129	*0.113*	*0.113*	*0.118*
lb/hr as NO_2	1.16E-04	*9.72E-05*	*1.01E-04*	*1.05E-04*
lb/MW-hr as NO_2	0.0019	*0.0016*	*0.0017*	*0.0017*
VOC Emissions:				
ppmvd as C	1.45	7.60	1.50	3.52
lb/hr as C_6H_{14}	0.0004	0.0020	0.0004	0.0010
lb/MW-hr as C_6H_{14}	0.0067	0.0339	0.0070	0.0159

Note: Results noted in italics were reported at the detection limit of the analyzer, 2% of the range.

Attachment IV
AQM-1; Administrative Information

DNREC – Division of Air Quality
Application to Construct, Operate, or Modify Stationary Sources

Administrative Information

One original and one copy of All Application Forms Should Be Mailed To:
Division of Air Quality
100 West Water Street, Suite 6A
Dover, DE 19904

All Checks Should Be Made Payable To:
State of Delaware

Company and Site Information

1.	Company Name: **Diamond State Generation Partners, LLC**		
2.	Company Mailing Address: **1299 Orleans Drive**		
	City: **Sunnyvale**	State: **CA**	Zip Code: **95014**
3.	Site Name: **Red Lion**		
4.	Site Mailing Address: *(if different from above)*		
	City:	State:	Zip Code:
5.	Physical Location of Site: **Tax Plot 100.50.00011,1593 River Road** *(if different from above)*		
	City: **Newcastle County**	State: **DE**	Zip Code: **19720**
6.	Site Billing Address: *(if different from above)*		
	City:	State:	Zip Code:
7.	Air Quality Management Facility ID Number:		
8.	Site NAICS Code): **221119** *(list all that apply*		
9.	Site SIC Code: **4991** *(list all that apply)*		
10.	Site Location Coordinates:	Latitude: 39.6118 ° deg' N" Longitude: 75.6253 ° deg' W"	
11.	Is the Facility New or Existing?	☐ NEW	☒ EXISTING
If the Facility is an Existing Facility, Complete the Rest of Question 11. If Not, Proceed to Question 12.			
11.1.	Does the Facility Have Active Air Permits?	☒ YES	☐ NO
12.	Is this Application For New Equipment or a Modification to Existing Equipment? ☐ New Equipment ☒ Modification of Existing Equipment ☐ Other (Specify):		
If the application is for the modification of existing equipment, complete the rest of Question 12. If not, proceed to Question 13.			

Company and Site Information	
12.1. Does the Equipment Have an Active Air Permit?	☒ YES ☐ NO
If the equipment has an active air permit, complete the rest of Question 12. If not, proceed to Question 13.	
12.2. Permit Number of Existing Equipment:	**APC-2012/0013**
13. Status of Equipment Being Applied For:	☒ Natural Minor Source ☐ Synthetic Minor Source ☐ Major Source ☐ Federally Enforceable Restrictions
14. Facility Status:	☐ Natural Minor Facility ☐ Synthetic Minor Facility ☐ Major Facility
If the facility is a Major Source, complete the rest of Question 14. If not, proceed to Question 15.	
14.1. Responsible Official Name:	
14.2. Responsible Official Title:	

Contact Information	
15.	Name of Owner or Facility Manager: **Diamond State Generation Partners, LLC**
16.	Title of Owner or Facility Manager: **N/A**
17.	Permit Contact Name: **Mark Mesler**
18.	Permit Contact Title: **Vice President**
19.	Permit Contact Telephone Number: **(408) 543-1743**
20.	Permit Contact Fax Number: **(408) 543-1501**
21.	Permit Contact E-Mail Address: **mark.mesler@bloomenergy.com**
22.	Billing Contact Name: **Mark Mesler**
23.	Billing Contact Title: **Vice President**
24.	Billing Contact Telephone Number: **(408) 543-1743**
25.	Billing Contact Fax Number: **(408) 543-1501**
26.	Billing Contact E-Mail Address: **mark.mesler@bloomenergy.com**

Proposed Construction and Operating Schedule	
27.	When Will the Proposed Construction/Installation/Modification Occur: 12/15/2018
28.	Proposed Operating Schedule: **24** hours/day **7** days/week **52** weeks/year
28.1. Is There Any Additional Information Regarding the Operating Schedule?	☐ YES ☒ NO
If YES, complete the rest of Question 28. If NO, proceed to Question 29.	

Proposed Construction and Operating Schedule

28.2. Describe the Additional Information:

Coastal Zone Information

29. Is the Facility Located in the Coastal Zone? ☒ YES ☐ NO

If the facility is located in the Coastal Zone complete the rest of Question 29. If not, proceed to Question 30.

29.1. Is a Coastal Zone Permit Required for Construction or Operation of the Source Being Applied for? ☐ YES ☒ NO

Attach a copy of the Coastal Zone Determination if it has not been previously submitted

If a Coastal Zone Permit is required complete the rest of Question 29. If not, proceed to Question 30.

29.2. Has a Coastal Zone Permit Been Issued? ☒ YES ☐ NO

Attach a copy of the Coastal Zone Permit if it has not been previously submitted

Local Zoning Information

30. Parcel Zoning: **S**

Attach Proof of Local Zoning if it has not been previously submitted

Application Information

31. Is the Appropriate Application Fee Attached? ☒ YES ☐ NO

32. Is the Advertising Fee Attached? ☒ YES ☐ NO

For help determining your application and advertising fees see:
http://www.dnrec.state.de.us/DNREC2000/Library/Fees/DE%20Permit%20Fees.htm

Attach the appropriate fees. Note that your Application will not be considered complete if the appropriate fees are not included.

33. Is a Cover Letter Describing the Process Attached? ☒ YES ☐ NO

Attach a brief cover letter describing your Application.

If the Facility is a New Facility complete Question 34. If not, proceed to Question35.

34. Is a Copy of the Applicant Background Information Questionnaire on Record at the Department? ☒ YES ☐ NO

If NO, complete the rest of Question 34. If YES, process to Question 35.

34.1 Is a Copy of the Applicant Background Information Questionnaire Attached? ☐ YES ☐ NO

For a copy of the Applicant Background Information Questionnaire see
http://www.dnrec.delaware.gov/services/Documents/Chapter79Form.pdf

Attach a copy of the Applicant Background Information Questionnaire if applicable.

35. Check Which Application Forms are Attached:

Application Information

☒ AQM-1	☐ AQM-3.4	☐ AQM-3.9	☐ AQM-3.14	☐ AQM-4.4	☐ AQM-4.9	☒ AQM-6
☒ AQM-2	☐ AQM-3.5	☐ AQM-3.10	☐ AQM-3.15	☐ AQM-4.5	☐ AQM-4.10	
☒ AQM-3.1	☐ AQM-3.6	☐ AQM-3.11	☐ AQM-4.1	☐ AQM-4.6	☐ AQM-4.11	
☐ AQM-3.2	☐ AQM-3.7	☐ AQM-3.12	☐ AQM-4.2	☐ AQM-4.7	☐ AQM-4.12	
☐ AQM-3.3	☐ AQM-3.8	☐ AQM-3.13	☐ AQM-4.3	☐ AQM-4.8	☒ AQM-5	

36. Check Which Documents are Attached:

- ☐ Coastal Zone Determination
- ☐ Coastal Zone Permit
- ☐ Proof of Local Zoning
- ☐ Application Fee
- ☐ Advertising Fee
- ☐ Applicant Background Information Questionnaire
- ☐ Claim of Confidentiality
- ☐ Manufacturer Specification(s)
- ☐ Material Safety Data Sheets (MSDSs)
- ☐ Supporting Calculations
- ☐ Descriptive Cover Letter
- ☐ Other (Specify):

Confidentiality Information

37. Do You Consider Any of the Information Submitted With this Application Confidential? ☐ YES ☒ NO

For help on how to submit a confidentiality claim see
http://regulations.delaware.gov/register/december2011/final/15%20DE%20Reg%20864%2012-01-11.htm

If a Claim of Confidentiality is made it MUST meet the requirements of Section 6 of DNREC's Freedom of Information ("FOIA") Regulation at the time the Application is submitted.

Signature Block

I, the undersigned, hereby certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all of its attachments as to the truth, accuracy, and completeness of this information. I certify based on information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete. By signing this form, I certify that I have not changed, altered, or deleted any portions of this application. I acknowledge that I cannot commence construction, alteration, modification or initiate operation until I receive written approval (i.e. permit, registration, or exemption letter) from the Department. I acknowledge that I may be required to perform testing of the equipment to receive construction or operation approval, and that if I do not receive approval to construct or operate that I may appeal the decision.

MARK MESLER
Owner or Operator

10/23/18
Date

Mark Mesler
Signature of Owner or Operator

One Original and One Copy of All Application Forms Should Be Mailed To:
Division of Air Quality
100 W. Water Street, Suite 6A
Dover, Delaware 19904

All Checks Should Be Made Payable To:
State of Delaware

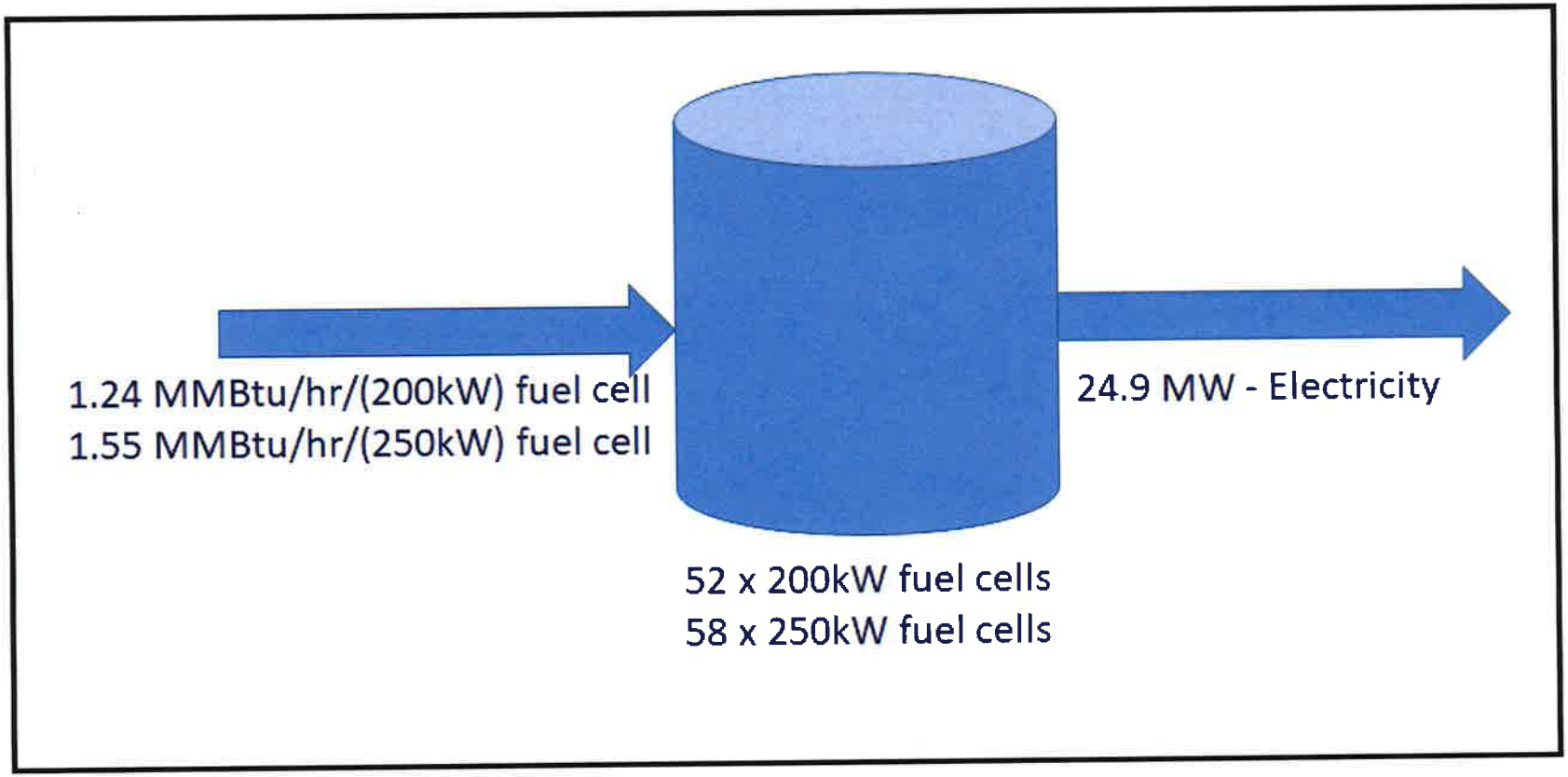
Attachment V
AQM-2; Process Flow Diagram

DNREC – Air Quality Management Section
Application to Construct, Operate, or Modify Stationary Sources

Form AQM-2
Page 1 of 1

Process Flow Diagram

Sketch the Process Flow Diagram for the equipment or process being applied for. Include each emission unit and control device (even existing emission units that will not be modified by this application). You may identify each emission unit with a simple shape. Label each emission unit and control device with a unique identifier. Show the relationship between each emission unit and/or control device by drawing arrows between them to indicate the flow of air pollutants. List which application forms are included for each emission unit or control device below the shape representing each emission unit or control device . See http://www.delaware.gov/reg2/default.htm for example Process Flow Diagrams for common processes. If you already have a Process Flow Diagram for the equipment or process being applied for, you may attach it to the application instead of using this form.



Attachment VI
AQM-3.1; Generic Process Equipment Application

Generic Process Equipment Application

If you are using this form electronically, press F1 at any time for help

General Information

1.	Facility Name: **Red Lion**
2.	Equipment ID Number: **E1 through E110**
3.	Provide a brief description of Equipment or Process: **The project consists of 110 fuel cells rated at 200kW or 250kW using natural gas to generate a total of 24.9MW**
4.	Manufacturer: **Bloom Energy**
5.	Model: **ES5-BABAAA (200 kW) & ES5-AACAAA (250kW)**
6.	Serial Number: **N/A**

Raw Material Information

7. Raw Materials Used in Process

If there are more than four Raw Materials used, attach additional copies of this page as needed.

	Raw Material Used	CAS Number	Usage Rate (include units)	MSDS Attached?
7.1.	**Natural Gas**	**N/A**	**1312 MMScf/yr**	☐ YES ☒ NO
7.2.				☐ YES ☐ NO
7.3.				☐ YES ☐ NO
7.4.				☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Raw Material used.

Products Produced Information

8. Products Produced

If there are more than four Products Produced, attach additional copies of this page as needed.

	Product Produced	CAS Number	Production Rate (include units)	MSDS Attached?
8.1.	**Electricity**	**N/A**	**24.9 MW**	☐ YES ☒ NO
8.2.				☐ YES ☐ NO
8.3.				☐ YES ☐ NO
8.4.				☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Product Produced.

Byproducts Generated Information

9. Byproducts Generated

If there are more than four Byproducts Generated, attach additional copies of this page as needed.

	Byproduct Generated	CAS Number	Generation Rate (include units)	MSDS Attached?
9.1.				☐ YES ☐ NO
9.2.				☐ YES ☐ NO
9.3.				☐ YES ☐ NO
9.4.				☐ YES ☐ NO

Attach a copy of all calculations made to support the data in the table above.
Attach a Material Safety Data Sheet (MSDS) for each Byproduct Generated.

General Information

10. Manufacturer's Rated Capacity or Maximum Throughput of Equipment or Process:
ES5-BABAAA (200kW): Qty: 52 Systems with a maximum of 1.24 MMBtu/hr of Natural Gas per fuel cell
ES5-AACAAA (250kW): Qty: 58 Systems with a maximum of 1.55 MMBtu/hr of Natural Gas per fuel cell

11. Describe Important Manufacturer Specifications and/or Operating Parameters for Equipment or Process:

Attach the Manufacturer's Specification Sheet(s) for the equipment or process.

Control Device Information

12. Is an Air Pollution Control Device Used? ☐ YES ☒ NO

If an Air Pollution Control Device is used, complete the rest of Question 12. If not, proceed to Question 13.

12.1. Is Knockout Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.11 and attach it to this application.

12.2. Is a Settling Chamber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.10 and attach it to this application.

12.3. Is an Inertial or Cyclone Collector Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.5 and attach it to this application.

12.4. Is a Fabric Collector or Baghouse Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.6 and attach it to this application.

12.5. Is a Venturi Scrubber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.8 and attach it to this application.

12.6. Is an Electrostatic Precipitator Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.7 and attach it to this application.

12.7. Is Adsorption Equipment Used? ☐ YES ☒ NO

Control Device Information

If YES, complete Form AQM-4.2 and attach it to this application.

12.8. Is a Scrubber Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.4 and attach it to this application.

12.9. Is a Thermal Oxidizer or Afterburner Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.1 and attach it to this application.

12.10. Is a Flare Used? ☐ YES ☒ NO

If YES, complete Form AQM-4.3 and attach it to this application.

12.11. Is Any Other Control Device Used? ☐ YES ☒ NO

If YES, attach a copy of the control device Manufacturer's Specification Sheet(s).

If any other control device is used, complete the rest of Question 12. If not, proceed to Question 13.

12.12. Describe Control Device: **N/A**

12.13. Pollutants Controlled: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ NO_X ☐ SO_X ☐ Metals ☐ Other (Specify):

12.14. Control Device Manufacturer: **N/A**

12.15. Control Device Model: **N/A**

12.16. Control Device Serial Number: **N/A**

12.17. Control Device Design Capacity: **N/A**

12.18. Control Device Removal or Destruction Efficiency: **N/A**

Stack Information

13. How Does the Process Equipment Vent:
(check all that apply)
☒ Directly to the Atmosphere
☐ Through a Control Device Covered by Forms AQM-4.1 through 4.12
☐ Through Another Control Device Described on This Form

If any of the process equipment vents directly to the atmosphere or through another control device described on this form, proceed to Question 14. If the process equipment vents through a control device, provide the stack parameters on the control device form and proceed to Question 18.

14. Number of Air Contaminant Emission Points: **110 fuel cells**

If there are more than three Emission Points, attach additional copies of this page as needed.

For the first Emission Point

15. Emission Point Name: **FC1 through FC110**

15.1. Stack Height Above Grade: **6.75 feet**

15.2. Stack Exit Diameter: **0.39 x 2.68 x (4 or 5 Power modules) feet**
(Provide Stack Dimensions If Rectangular Stack)

15.3. Is a Stack Cap Present? ☐ YES ☒ NO

15.4. Stack Configuration: ☒ Vertical ☐ Horizontal ☐ Downward-Venting
(check all that apply) ☐ Other (Specify):

Stack Information
15.5. Stack Exit Gas Temperature: **204 °F**
15.6. Stack Exit Gas Flow Rate: **440 x (4 or 5 Power modules) ACFM**
15.7. Distance to Nearest Property Line: **100 feet**
15.8. Describe Nearest Obstruction: **tree**
15.9. Height of Nearest Obstruction: **20 feet**
15.10. Distance to Nearest Obstruction: **50 feet**
15.11. Are Stack Sampling Ports Provided? ☐ YES ☒ NO
For the second Emission Point. If there is no second Emission Point, proceed to Question 18.
16. Emission Point Name:
16.1. Stack Height Above Grade: **feet**
16.2. Stack Exit Diameter: **feet** *(Provide Stack Dimensions If Rectangular Stack)*
16.3. Is a Stack Cap Present? ☐ YES ☐ NO
16.4. Stack Configuration: *(check all that apply)* ☐ Vertical ☐ Horizontal ☐ Downward-Venting ☐ Other (Specify):
16.5. Stack Exit Gas Temperature: **°F**
16.6. Stack Exit Gas Flow Rate: **ACFM**
16.7. Distance to Nearest Property Line: **feet**
16.8. Describe Nearest Obstruction:
16.9. Height of Nearest Obstruction: **feet**
16.10. Distance to Nearest Obstruction: **feet**
16.11. Are Stack Sampling Ports Provided? ☐ YES ☐ NO
For the third Emission Point. If there is no third Emission Point, proceed to Question 18.
17. Emission Point Name:
17.1. Stack Height Above Grade: **feet**
17.2. Stack Exit Diameter: **feet** *(Provide Stack Dimensions If Rectangular Stack)*
17.3. Is a Stack Cap Present? ☐ YES ☐ NO
17.4. Stack Configuration: *(check all that apply)* ☐ Vertical ☐ Horizontal ☐ Downward-Venting ☐ Other (Specify):
17.5. Stack Exit Gas Temperature: **°F**
17.6. Stack Exit Gas Flow Rate: **ACFM**
17.7. Distance to Nearest Property Line: **feet**
17.8. Describe Nearest Obstruction:
17.9. Height of Nearest Obstruction: **feet**
17.10. Distance to Nearest Obstruction: **feet**

Stack Information

17.11. Are Stack Sampling Ports Provided? ☐ YES ☐ NO

Monitoring Information

18. Will Emissions Data be Recorded by a Continuous Emission Monitoring System? ☐ YES ☒ NO

If Yes, attach a copy of the Continuous Emission Monitoring System Manufacturer's Specification Sheets

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.1. Pollutants Monitored: ☐ VOCs ☐ HAPs ☐ PM ☐ PM_{10} ☐ $PM_{2.5}$ ☐ NO_x ☐ SO_x ☐ Metals ☐ Other (Specify):

18.2. Describe the Continuous Emission Monitoring System:

18.3. Manufacturer:

18.4. Model:

18.5. Serial Number:

18.6. Will Multiple Emission Units Be Monitored at the Same Point? ☐ YES ☐ NO

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.7. Emission Units Monitored:

18.8. Will More Than One Emission Unit be Emitting From the Combined Point At Any Time? ☐ YES ☐ NO

If YES, complete the rest of Question 18. If NO, proceed to Question 19.

18.9. Emission Units Emitting Simultaneously:

Voluntary Emission Limitation Request Information

19. Are You Requesting Any Voluntary Emission Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 19. If NO, proceed to Question 20.

19.1. Describe Any Requested Emission Limitations:

Voluntary Operating Limitation Request Information

20. Are You Requesting Any Voluntary Operating Limitations to Avoid Major Source Status, Minor New Source Review, MACT, NSPS, etc.? ☐ YES ☒ NO

If YES, complete the rest of Question 20. If NO, proceed to Question 21.

Voluntary Operating Limitation Request Information
20.1. Describe Any Requested Operating Limitations:

Additional Information	
21. Is There Any Additional Information Pertinent to this Application?	☒ YES ☐ NO
If YES, complete the rest of Question 21.	
21.1. Describe: **See Air Permit Application**	

Attachment VII
AQM-5; Emissions Information Application

Emissions Information Application

If you are using this form electronically, press F1 at any time for help

Process Information

1.	Number of Individual Pieces of Process Equipment in Process: **110 (Combination of 52 200kW & 58 250kW fuel cells)**
2.	Number of Individual Control Devices in Process: **0**

Emissions Information for First Emission Point/Stack

3.	Emission Point Name: **1-52 Emission Data for each individual fuel cell (200kW)**
4.	Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack: **1-52**
5.	Pollutant Emissions

If more than 15 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 5.10 through 5.18)	CAS Number (Not required for 5.1 through 5.10)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Requested Permitted Annual Emissions
5.1.	Particulate Matter (PM)		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	**0** tons/year
5.2.	PM_{10}		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	**0** tons/year
5.3.	$PM_{2.5}$		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	**0** tons/year
5.4.	Sulfur Oxides (SO_X)		**0.00002 lbs/hour**	**0.00002 lbs/hour**	**0.00009** tons/year	tons/year
5.5.	Nitrogen Oxides (NO_X)		**0.00034 lbs/hour**	**0.00034 lbs/hour**	**0.0015** tons/year	tons/year
5.6.	Carbon Monoxide (CO)		**0.007 lbs/hour**	**0.007 lbs/hour**	**0.0298** tons/year	tons/year
5.7.	Total Volatile Organic Compounds (VOCs)		**0.0032 lbs/hour**	**0.0032 lbs/hour**	**0.0139** tons/year	tons/year
5.8.	Total Hazardous Air		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year

Emissions Information for First Emission Point/Stack

	Pollutants (HAPs)					
5.9.	CO_2		**140 lbs/hour**	**140 lbs/hour**	**613.2** tons/year	tons/year
5.10.	CO_{2e}		**140 lbs/hour**	**140 lbs/hour**	**556.6 MT/year** tons/year	tons/year
5.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
5.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

6. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Second Emission Point/Stack

7. Emission Point Name: **53-110 Emission Data for each individual fuel cell (250kW)**

8. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack: **53-110**

9. Pollutant Emissions

If more than 15 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 9.10 through 9.18)	CAS Number (Not required for 9.1 through 9.10)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Requested Permitted Annual Emissions
9.1.	Particulate Matter (PM)		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
9.2.	PM_{10}		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year

Emissions Information for Second Emission Point/Stack						
9.3.	$PM_{2.5}$		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
9.4.	Sulfur Oxides (SO_X)		**0.000025 lbs/hour**	**0.000025 lbs/hour**	**0.00011** tons/year	tons/year
9.5.	Nitrogen Oxides (NO_X)		**0.00043 lbs/hour**	**0.00043 lbs/hour**	**0.0019** tons/year	tons/year
9.6.	Carbon Monoxide (CO)		**0.009 lbs/hour**	**0.009 lbs/hour**	**0.0372** tons/year	tons/year
9.7.	Total Volatile Organic Compounds (VOCs)		**0.004 lbs/hour**	**0.004 lbs/hour**	**0.0174** tons/year	tons/year
9.8.	Total Hazardous Air Pollutants (HAPs)		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
9.9.	CO_2		**175 lbs/hour**	**175 lbs/hour**	**766.5** tons/year	tons/year
9.10.	CO_{2e}		**175 lbs/hour**	**175 lbs/hour**	**695.7 MT/year** tons/year	tons/year
9.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
9.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
10.	Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:					
Attach the Basis of Determination or Calculations for each Emission Rate provided above.						

Emissions Information for Third Emission Point/Stack	
11.	Emission Point Name:
12.	Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

Emissions Information for Third Emission Point/Stack

13. Pollutant Emissions

If more than 15 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 13.10 through 13.18)	CAS Number (Not required for 13.1 through 13.10)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Requested Permitted Annual Emissions
13.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.4.	Sulfur Oxides (SO_x)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.5.	Nitrogen Oxides (NO_x)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.7.	Total Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.8.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.9.	CO_2		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.10.	CO_{2e}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.11.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
13.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Third Emission Point/Stack

14. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Emissions Information for Fourth Emission Point/Stack

15. Emission Point Name:

16. Equipment ID Number for all Process Equipment and Control Devices Venting Through Emission Point/Stack:

17. Pollutant Emissions

If more than 15 pollutants are emitted at this Emission Point/Stack, attach additional copies of this page as needed.

	Pollutant Name (Specify VOCs and HAPs Individually in 17.10 through 17.18)	CAS Number (Not required for 17.1 through 17.10)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Requested Permitted Annual Emissions
17.1.	Particulate Matter (PM)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.2.	PM_{10}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.3.	$PM_{2.5}$		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.4.	Sulfur Oxides (SO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.5.	Nitrogen Oxides (NO_X)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.6.	Carbon Monoxide (CO)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.7.	Volatile Organic Compounds (VOCs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.8.	Total Hazardous Air Pollutants (HAPs)		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.9.	CO_2		**lbs/hour**	**lbs/hour**	tons/year	tons/year

Emissions Information for Fourth Emission Point/Stack					
17.10. CO_{2e}		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.11.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.12.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.13.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.14.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
17.15.		**lbs/hour**	**lbs/hour**	tons/year	tons/year
18. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:					
Attach the Basis of Determination or Calculations for each Emission Rate provided above.					
If there are more than four Emission Points/Stacks, attach additional copies of this form as needed.					

Overall Process Emissions					
19. Pollutant Emissions					
If more than 15 pollutants are emitted from this Process, attach additional copies of this page as needed.					
Pollutant Name (Specify VOCs and HAPs Individually in 19.10 through 19.18)	CAS Number (Not required for 19.1 through 19.10)	Maximum Uncontrolled Emission Rate at Design Capacity	Maximum Controlled Emission Rate at Design Capacity	Annual Potential to Emit (PTE)	Requested Permitted Annual Emissions
19.1. Particulate Matter (PM)		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.2. PM_{10}		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.3. $PM_{2.5}$		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.4. Sulfur Oxides (SO_X)		**0.0025 lbs/hour**	**0.0025 lbs/hour**	**0.011** tons/year	tons/year
19.5. Nitrogen Oxides (NO_X)		**0.042 lbs/hour**	**0.042 lbs/hour**	**0.19** tons/year	tons/year

Overall Process Emissions

19.6.	Carbon Monoxide (CO)		**0.85 lbs/hour**	**0.85 lbs/hour**	**3.71** tons/year	tons/year
19.7.	Total Volatile Organic Compounds (VOCs)		**0.40 lbs/hour**	**0.40 lbs/hour**	**1.73** tons/year	tons/year
19.8.	Total Hazardous Air Pollutants (HAPs)		**0 lbs/hour**	**0 lbs/hour**	**0** tons/year	tons/year
19.9.	CO_2		**17430 lbs/hour**	**17430 lbs/hour**	**76343** tons/year	tons/year
19.10.	CO_{2e}		**17438 lbs/hour**	**17438 lbs/hour**	**69291 MT/year** tons/year	tons/year
19.12.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.13.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.14.			**lbs/hour**	**lbs/hour**	tons/year	tons/year
19.15.			**lbs/hour**	**lbs/hour**	tons/year	tons/year

20. Provide Any Additional Information Necessary to Understanding the Emission Rates Provided Above:

Attach the Basis of Determination or Calculations for each Emission Rate provided above.

Minor New Source Review Information

21. Does the Process Have the Potential to Emit More Than Five Tons Per Year of Any Pollutant? ☒ YES ☐ NO

22. Is the Source New or Existing? ☐ NEW ☒ EXISTING
See Question 11 of AQM-1

If the Process has the Potential to Emit more than five tons per year of any pollutant, and is a New Source, a Control Technology Analysis pursuant to Regulation No. 1125 Section 4 must be conducted and attached to this application.

Major New Source Review Information

23. Does the Process Have the Potential to Emit More Than the Significance Level for Any Pollutant? *(Check All That Apply)*

- ☐ Greater Than 25 Tons Per Year of Particulate Matter (PM)
- ☐ Greater Than 15 Tons Per Year of PM_{10}
- ☐ Greater Than 10 Tons Per Year of $PM_{2.5}$
- ☐ Greater Than 40 Tons Per Year of Sulfur Dioxide(SO_2)
- ☐ Greater Than 25 Tons Per Year of Nitrogen Oxides (NO_X) in New Castle and Kent County
- ☐ Greater Than 100 Tons Per Year of Nitrogen Oxides (NO_X) in Sussex County
- ☐ Greater Than 100 Tons Per Year of Carbon Monoxide (CO)
- ☐ Greater Than 25 Tons Per Year of Total Volatile Organic Compounds (VOCs) in New Castle and Kent County
- ☐ Greater Than 50 Tons Per Year of Total Volatile Organic Compounds (VOCs) in Sussex County
- ☐ Greater Than 75,000 Tons Per Year of Equivalent Carbon Dioxide (CO_{2e})

If the Process has the Potential to Emit greater than any of the amounts listed above 7 DE Admin. Code 1125 Sections 2 and/or 3 apply. Contact the Department at (302) 323-4542 or (302) 739-9402 for additional information

Additional Information

24. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 24.

24.1. Describe: **See attached application**

Attachment VIII
AQM-6 Air Emission Modeling Application

Air Emissions Modeling Application

This form is optional. Applications will be considered complete without this form. Completing this form may expedite processing of your permit.

If you are using this form electronically, press F1 at any time for help. For additional help conducting air emissions modeling see the air contaminant equipment registration form booklet sections V and VI available at:
http://www.awm.delaware.gov/AQM/Pages/AirContaminantEquipmentRegistration.aspx.

General Information

1. Identification of Equipment/Process Being Modeled: **Red Lion 110 Fuel Cells**

2. Modeling Tool Used: ☐ SCREEN3 ☒ AERSCREEN ☐ Other (Specify):
☐ ISC3 ☐ AERMOD

Modeling Information

3. Modeling Information

If there are more than 20 Contaminants, attach additional copies of this page as needed

	Contaminant Name	Maximum Controlled Emission Rate at Design Capacity	Short Term Emission Rate	Threshold Limit Value (TLV)	TLV Source	Maximum Downwind Concentration (MDC) (8-Hour Average)	TLV:MDC Ratio
3.1.	**NOx**	**1.008** lbs/day	**0.0053** grams/second	mg/m^3		mg/m^3	
3.2.	**CO**	**20.4** lbs/day	**0.107** grams/second	mg/m^3		mg/m^3	
3.3.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.4.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.5.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.6.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.7.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.8.		lbs/day	grams/second	mg/m^3		mg/m^3	
3.9.		lbs/day	grams/second	mg/m^3		mg/m^3	

Modeling Information

3.10.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.11.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.12.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.13.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.14.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.15.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.16.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.17.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.18.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.19.	lbs/day	grams/second	mg/m^3		mg/m^3	
3.20.	lbs/day	grams/second	mg/m^3		mg/m^3	

NOTE: If the TLV:MDC Ratio is less than 100 for any of the Contaminants listed above, the equipment may not be eligible for approval. Contact the Department immediately to discuss the situation.

Attach copies of all modeling analyses conducted.

Additional Information

4. Is There Any Additional Information Pertinent to this Application? ☒ YES ☐ NO

If YES, complete the rest of Question 4.

4.1. Describe: **1 hr CO and NOx AERSCREEN modeling**

Attachment IX
AERSCREEN Modeling Report

AERSCREEN MODELING REPORT
CO AND 1-HOUR NOx EMISSIONS
23 – OCT- 2018

RED LION UPGRADE PROJECT

TABLE OF CONTENTS

1.0 Purpose of Study

This modeling study was performed at the request of the Delaware Department of Natural Resources and Environmental Control (DNREC) for the purpose of predicting the 1-hour/8-hour CO and 1-hour NO_2 impacts from Diamond State Generation Partners, LLC proposed upgrade of the existing Red Lion Project. The Red Lion upgrade project consists of removing 134 natural gas fueled ES-5700 Energy Server fuel cells, each with an output capacity of 200kWwith 52 latest generation ES5-BABAAA Energy servers, each with an output capacity of 200kW and 58 latest generation ES5-AACAAA Energy servers, each with an output capacity of 250kW. The Red Lion Power Project is located just east of Route 9 (River Road) approximately 1.5 north of the Delaware City Refinery in city of New Castle, Delaware.
DNREC is seeking assurance that the CO and NOx emissions from this proposed facility can demonstrate compliance with the short-term CO and NO_2 National Ambient Air Quality Standard (NAAQS).

The following sections of this report provide the details for the AERSCREEN analysis used to determine compliance with the short-term CO and NO_2 standards. Section 2 provides a detailed description of the modeling methodology used for this study, Section 3 provides the results from this study documenting that AERSCREEN shows compliance with the short-term CO and NO_2 standards.

2.0 Modeling Methodology

The modeling performed for this study is a screening level analysis of 1-hour/8-hour CO and 1-hour NO_2 impacts, as requested by DNREC. This modeling was conducted following current USEPA modeling guidance. The following subsections 2.1 through 2.5 contain the detailed information regarding site characterization, meteorological and background monitored data, and model options used for this study. The majority of the assumptions from the original modeling work in 2012 have been retained.

On March 1, 2011 EPA released a clarification memo regarding various aspects of modeling for demonstration of compliance with the 1-hour NO_2 NAAQS.[1] Included within this memo is a discussion regarding the three-tier approach than can be employed for modeling of 1-hour NO_2, as well as a clarification on what is appropriate to use for the assumption of background NO_2 concentrations. In 2012, all modeling for this analysis was performed in a manner consistent with this memo including use of the 3-year average of monitored annual 98th percentile daily 1-hour maximum NO_2 concentration as the background concentration for NAAQS comparison (see Section 2.4).

The tiered approach to modeling 1-hour NO_2 is a hierarchical structure, with Tier 1 the most conservative, while Tier 3 is the least conservative. The assumptions for each tier are as follows:

- Tier 1 – Model the facility assuming that all NOx emitted from a facility is emitted as NO_2.
- Tier 2 – Use a default ambient ratio of 0.80 for conversion of NOx to NO_2. This allows for a facility to subtract 20% from the total NOx impact predicted in Tier 1.
- Tier 3 – Use the AERSCREEN model, utilizing the PVMRM and/or OLM approaches.

For the upgrade project, Tier 1 was assumed, as this is the most conservative.

[1] *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*, USEPA-OAQPS memo, Tyler Fox, March 1, 2011.

2.1 Model Used

Short-range transport dispersion model predictions (within 10 km of the facility) are required for this analysis to determine project-alone impacts for comparison to the short-term CO and NO_2 NAAQS.

For the original project, the AERSCREEN model (Ver. 11126) was the EPA's "preferred/recommended" screening model for use in modeling analyses with plume transport distances of less than 50 km. In March 2011, the U.S. EPA released AERSCREEN, a screening model based on the AERMOD dispersion algorithms, which is expected generally to yield more realistic concentrations than the existing SCREEN3 model, while maintaining conservatism over more refined analyses. Use of AERSCREEN for the screening analysis of this Project conforms to both EPA and DNREC recommendations. The upgrade project used AERSCREEN version 16216 released 1/17/2017.

2.2 Source Parameters

The original Red Lion Power Project consists of 134 individual fuel cells arranged in two distinct areas as depicted in Figure 2-1. After the upgrade, the eastern area (Block 1) will contain eight 10 cell blocks and one 5 cell block while the western area (Block 2) will contain the remaining five 10 cell blocks. Each original individual fuel cell is approximately 25.5'L x 8.5'W x 6.75'H. The upgrade fuel cells are of similar dimensions. Block 1 is approximately 400'L x 132'W x 6.75'H and Block 2 is approximately 218'L x 132'W x 6.75'H. Each individual fuel cell utilizes approximately 1.32 MMBtu/hr of natural gas at full load to produce 200 kW of net power output. As part of the chemical reaction within the fuel cell, NOx is formed and emitted at rate shown in the following table. **Note that after the upgrade, the total amount of NOx emitted from the site will have decreased by 19 %.**

NOx Emission Rates (200kW)		
Original Project	0.0021 lb/MW-hr	0.0567 lb/hr site total
Upgrade Project	0.0017 lb/MW-hr	0.0425 lb/hr site total

Likewise CO is also formed as part of this chemical reaction and emitted at a rate shown in the following table. **Note that after the upgrade, the total amount of CO emitted from the site will have decreased by 66 %.**

CO Emission Rates (200 kW)		
Original Project	0.10 lb/MW-hr	2.70 lb/hr site total
Upgrade Project	0.034 lb/MW-hr	0.85 lb/hr site total

AERSCREEN contains algorithms for modeling of several different types of emissions sources including volume sources. Volume source algorithms are valid for modeling releases from multiple vents and given the source characteristics of the fuel cell emissions, coupled with the fact that they are arranged in blocks, the fuel cells were modeled as volume type sources. Calculations for the upgrade project are also based on the Volume Source algorithm.

The AERSCREEN model is, by design, a conservative screening model and only allows the modeling of a single source for each run. In order to model the combined emissions from the concurrent operations of all of the fuel cells within AERSCREEN each of the two fuel cell blocks was modeled individually utilizing the center point of the site. Based on the physical alignment of the fuel cells the worst case wind direction will be one that blows parallel to the axis of the center points of the fuel cells such that the emissions from each are additive, the red line on original Figure 2-1 depicts these worst-case wind directions (generally NW - SE axis). Both wind direction conditions were modeled for each fuel cell block with distances from the center of the fuel cell block to the fenceline adjusted based on the wind direction. For each wind direction the maximum predicted AERSCREEN short-term CO and NO_2 impacts, regardless of location, can be added together for a total impact that is used for comparison with the NAAQS.

Volume sources require the user to input an emission rate, release height, and both the initial lateral (sigma-y) and vertical (sigma-z) dimensions of the volume source. These last two parameters were calculated pursuant to the methodology detailed in Table 3-1 of the AERMOD Users Guide[2] and all volume source parameters utilized for AERSCREEN are summarized in Table 2-1. These values have been retained for the upgrade project.

2.3 AERSCREEN Inputs

In addition to the source parameters described in Section 2.2 AERSCREEN requires site specific information regarding land use and topography. AERSCREEN utilizes USGS Land Use/Land Classification (LULC) and USGS National Elevation Dataset (NED) for the required land use and topography information, respectively. Given the use of surface characteristics and terrain, it was important that the exact coordinate of the source, i.e., stack or center location of volume, be input into the model. Based upon the drawings provided by the original project it was determined that the approximate center of the facility is located at UTM coordinate 446225m, 4384873m based upon NAD83 projection, located within UTM Zone 18. This geometry was not modified for the upgrade project.

AERSCREEN requires the user to input a minimum and maximum receptor distance for impact prediction. The minimum receptor distance for each modeled case was set to the distance from the center of the fuel cell block to the nearest physical fenceline for the wind direction being analyzed. EPA considers all locations that the public is not precluded access to via a physical barrier as ambient air. As a result the physical fenceline and not the property line was used for the determination of the nearest modeling receptor which is consistent with current EPA guidance.

[2] Users Guide for the AMS/EPA Regulatory Model – AERMOD, EPA-454/B-03-001, September 2004.

The maximum modeling receptor distance was set to 5 km from the source. Figure 2-1 depicts the facility fenceline in relation to the fuel cell locations.

AERSCREEN calculated the appropriate receptor elevations utilizing the following 7.5 minute NED files:

- Saint Georges, DE
- Delaware City, DE
- Wilmington South, DE
- Newark East, DE

The meteorological data utilized by AERCREEN is inherently built into the model and represents a calculated range of site-specific conditions designed to determine a conservative worst-case impact. AERSCREEN provides three options for surface characteristics inputs for generating this screening meteorology.

One option allows for user-specified surface characteristics – albedo, Bowen ratio, and surface roughness (no spatial or temporal variation), the second option is to use seasonally varying surface characteristics for generic land use classifications. The third option is to input the name of an external file such as an AERSURFACE output file. Monthly, seasonal, and annual output for one sector or multiple sectors is allowed with the third option.

For this analysis the third option of utilizing a site specific AERSURFACE file was chosen. AERSURFACE was run based on the following:

- UTM coordinate of 446225m, 4384873m (Zone 18, NAD 83)
- 1992 USGS Land Use Data
- 4 Sectors (0-90 deg, 90-180 deg, 180-270 deg, 270-360 deg)
- 4 seasons with winter assumed to not have continuous snow cover
- 1 km radius for surface roughness, 10km domain for Bowen Ratio and Albedo

The original AERSURFACE file was also used for the upgrade project. Table 2-2 summarizes the surface parameters calculated by AERSURFACE for each sector/season and subsequently was used as input to AERSCREEN for creating the site-specific screening meteorological data.

AERSCREEN also allows the option to include NOx to NO_2 conversion either by using the Ozone Limiting Method (OLM). The OLM utilizes a chemical transformation algorithm in order to estimate the conversion of emitted NOx to NO_2 based on an assumed background ozone concentration. Use of the OLM option requires the user to input two items:

1. The NO_2/NOx in-stack ratio, which is the ratio of NO_2 to total NOx in the exhaust flow of the source being modeled. EPA guidance suggests the use of a default ratio of 0.5 unless source specific information is available. For this analysis, an in-stack ratio of 0.5 was used for the OLM option since source specific information was not available.

2. A representative ozone background concentration. 1-hour monitored ozone data from the nearest EPA monitoring station (Lums Pond State Park) was reviewed for the most recent 3-year period available (2008 – 2010). This monitoring site located at a distance of approximately 7.0 miles southwest of the project site. The average hourly ozone concentration over the 2008-2010 3-year period was calculated to be 0.05262 ppm. This value was used as the representative ozone background concentration for the OLM option.

Although the original project used the Ozone Limiting Method, the more conservative approach of Tier 1 (assuming all NOx is emitted as NO2) was selected for the upgrade project, since the overall NOx emissions are significantly decreased.

2.4 Background Data

In order to define the existing overall air quality setting for proper CO and NO_2 comparison with the NAAQS, monitored background concentrations from the EPA monitoring network for the original project are provided in Table 2-3. This table shows the monitored 98th-percentile 1-hour NO_2 levels as well as the maximum monitored 1-hour and 8-hour CO levels from the nearest EPA monitoring station for the most recent 3-year period available (2008 – 2010). The nearest EPA site for both pollutants was located at a distance of approximately 9.5 miles north of the project site.

Table 2-1
Parameters for Modeling Red Lion Project within AERSCREEN

Volume Source Configuration – Block 1 (85 Fuel Cells)

Parameter	Original Value	Upgrade Project Value	Notes
Source Height (ft)	6.75 ft	6.75 ft	Top of Fuel Cell
Initial Sigma-Z (ft)	3.14 ft	3.14 ft	Fuel Cell Height divided by 2.15
Source Length (ft)	400.0 ft	400.0 ft	
Source Width (ft)	132.0 ft	132.0 ft	
Source Area (ft^2)	52,800 ft^2	52,800 ft^2	
Volume Source Length (ft)	229.8 ft	229.8 ft	Assumes all sides equal
Initial Sigma-Y (ft)	53.4 ft	53.4 ft	Source length divided by 4.3
Distance to Fence (NW Wind)	242 ft	242 ft	From center of volume
Distance to Fence (SE Wind)	688 ft	688 ft	source
NOx Emission Rate	0.0021 lb/MW-hr 0.036 lb/hr (total)	0.0017 lb/MW-hr 0.0255 lb/hr (total)	Vendor Provided Data
CO Emission Rate	0.010 lb/MW-hr 1.7 lb/hr (total)	0.034 lb/MW-hr 0.51 lb/hr (total)	Vendor Provided Data

Volume Source Configuration – Block 2 (50 Fuel Cells)

Parameter	Original Value	Upgrade Project Value	Notes
Source Height (ft)	6.75 ft	6.75 ft	Top of Fuel Cell
Initial Sigma-Z (ft)	3.14 ft	3.14 ft	Fuel Cell height divided by 2.15
Source Length (ft)	218.0 ft	218.0 ft	
Source Width (ft)	132.0 ft	132.0 ft	
Source Area (ft^2)	28,776 ft^2	28,776 ft^2	
Volume Source Length (ft)	169.6 ft	169.6 ft	Assumes all sides equal
Initial Sigma-Y (ft)	39.4 ft	39.4 ft	Source length divided by 4.3
Distance to Fence (NW Wind)	735 ft	735 ft	From center of volume
Distance to Fence (SE Wind)	193 ft	193 ft	source
1-Hour NOx Emission Rate	0.00021lb/MW-hr 0.021 lb/hr (total)	0.0017 lb/MW-hr 0.017 lb/hr (total)	Vendor Provided Data
CO Emission Rate	0.010 lb/MW-hr 1.00 lb/hr (total)	0.034 lb/MW-hr 0.34 lb/hr (total)	Vendor Provided Data

Table 2-2
AERSURFACE Parameters for Modeling Red Lion Project
Use for both the Original Project and the Upgrade Project

Sector	Season	Albedo	Bowen Ratio	Surface Roughness (m)
0 - 90 degrees	Winter (Dec-Feb)	0.15	0.42	0.072
	Spring (Mar-May)	0.14	0.29	0.088
	Summer (Jun-Aug)	0.15	0.30	0.182
	Autumn (Sep-Nov)	0.15	0.41	0.182
90 - 180 degrees	Winter (Dec-Feb)	0.15	0.42	0.037
	Spring (Mar-May)	0.14	0.29	0.046
	Summer (Jun-Aug)	0.15	0.30	0.083
	Autumn (Sep-Nov)	0.15	0.41	0.083
180 - 270 degrees	Winter (Dec-Feb)	0.15	0.42	0.019
	Spring (Mar-May)	0.14	0.29	0.026
	Summer (Jun-Aug)	0.15	0.30	0.095
	Autumn (Sep-Nov)	0.15	0.41	0.095
270 - 360 degrees	Winter (Dec-Feb)	0.15	0.42	0.026
	Spring (Mar-May)	0.14	0.29	0.039
	Summer (Jun-Aug)	0.15	0.30	0.216
	Autumn (Sep-Nov)	0.15	0.41	0.216

Notes:

- Winter season assumes after frost and no continuous snow cover
- Spring season assumes transitional spring (partial green coverage, short annuals)
- Summer season assumes mid-summer with lush vegetation
- Autumn season assumes unharvested cropland

Table 2-3
Background (in µg/m³) Concentrations For NAAQS Comparison (Wilmington, DE)
For the Original Project

Pollutant	Averaging Period	Monitoring Station Location	Dist. (mi)	Dir. (deg)	2008	2009	2010	Ambient Standard
NO_2	1-Hour	MLK Blvd & Justison St	9.5	355	(127.8 + 101.5 + 94.0) / 3 = 107.8*			188[a]
CO	1-Hour	MLK Blvd & Justison St	9.5	355	2,400	3,200*	2,023	40,000
	8-Hour				1,444	1,556*	1,444	10,000

[a] Newly promulgated NAAQS one-hour NO_2 value is 100 ppb (188 µg/m³). The new NAAQS standard is statistical, based on the 3-year rolling average of the 98th-percentile of daily maximum 1-hour averages for each year.

* Indicates background value used in analysis.

Note: Direction indicated is from Red Lion Project site to monitor.

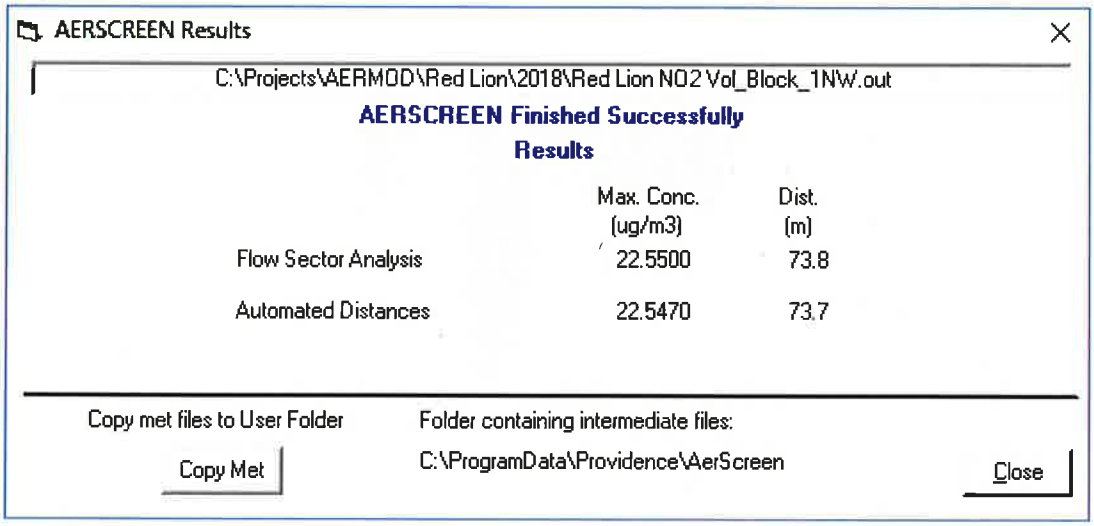
Figure 2-1
Red Lion Project – Original Site Layout

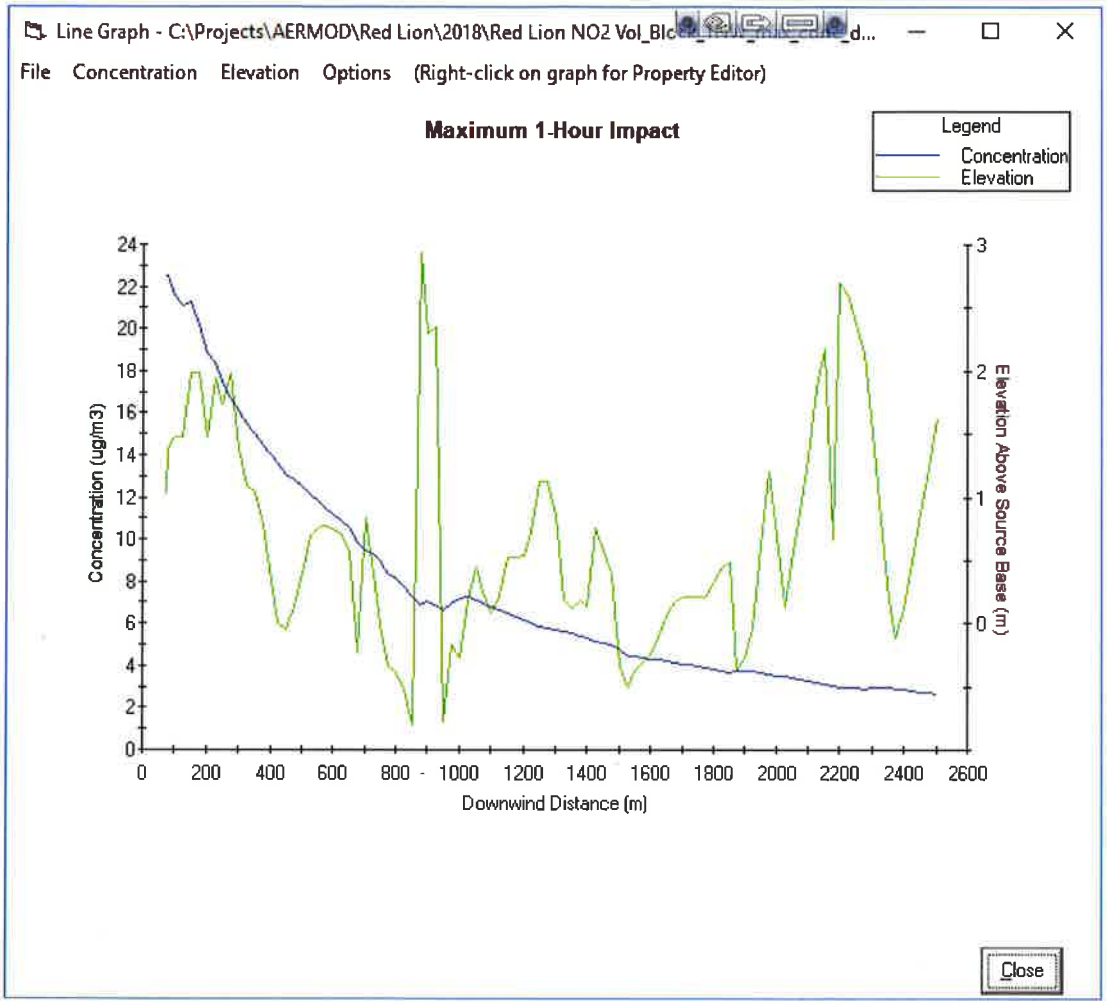
3.0 Modeling Results – Upgrade Project

The following sections present screenshots of the AERSCREEN modeling results for 1-hour NO_2, 1-hour CO and 8-hour CO for the Red Lion Upgrade Project. All of the AERSCREEN modeling input and output files necessary to reproduce the upgrade project modeling results are included in the attached zip file.

3.1 1-Hour NO_2

Block 1

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Maximum 1-Hour Impact
Legend
Concentration
Elevation
Concentration (ug/m3)
Elevation Above Source Base (m)
Downwind Distance (m)
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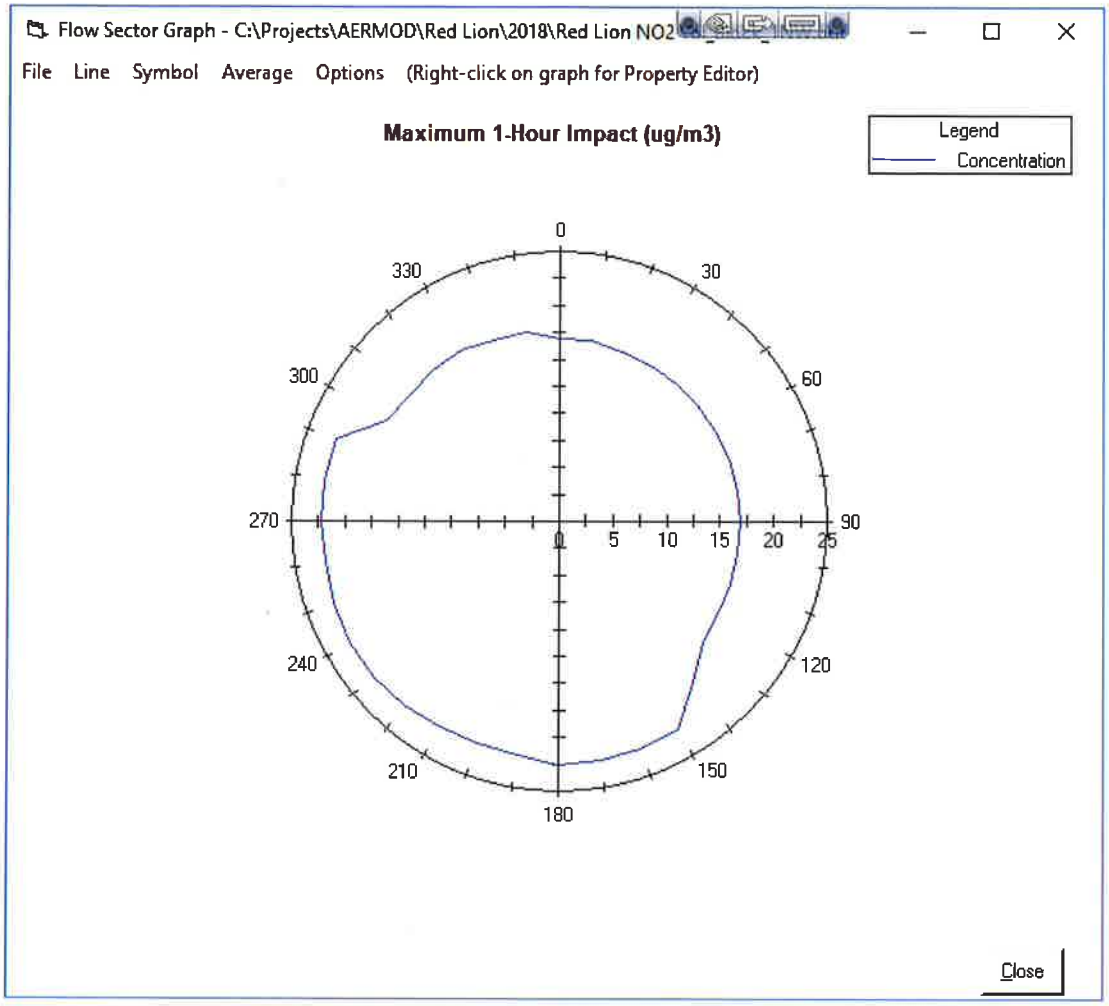
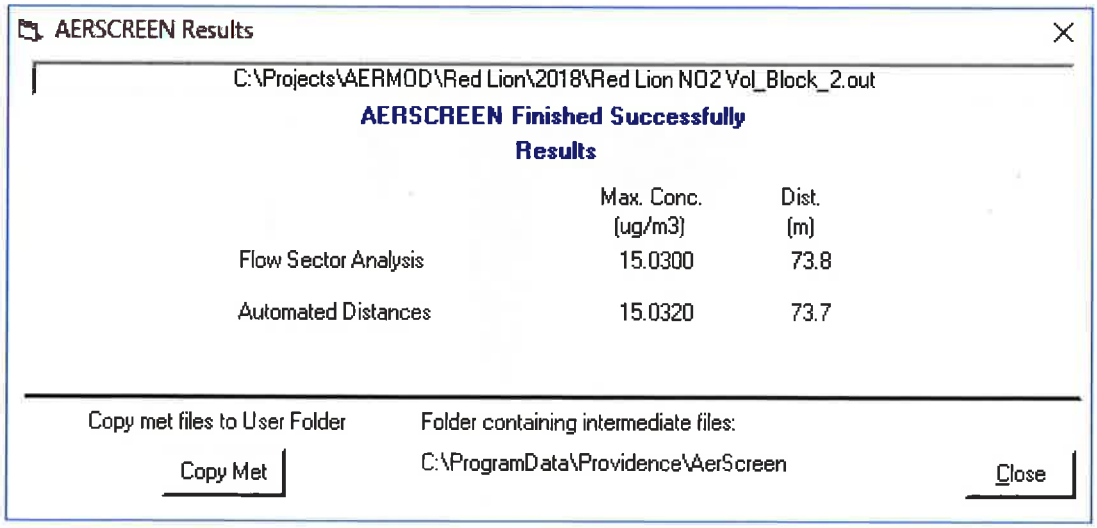
0 2 4 6 8 10 12 14 16 18 20 22 24
0 1 2 3
Close


Flow Sector Graph - C:\Projects\AERMOD\Red Lion\2018\Red Lion NO2
File Line Symbol Average Options (Right-click on graph for Property Editor)
Maximum 1-Hour Impact (ug/m3)
Legend
Concentration
0
30
60
90
120
150
180
210
240
270
300
330
0
5
10
15
20
25
Close

Block 2


AERSCREEN Results
C:\Projects\AERMOD\Red Lion\2018\Red Lion NO2 Vol_Block_2.out
AERSCREEN Finished Successfully
Results
Max. Conc. (ug/m3)
Dist. (m)
Flow Sector Analysis
15.0300
73.8
Automated Distances
15.0320
73.7
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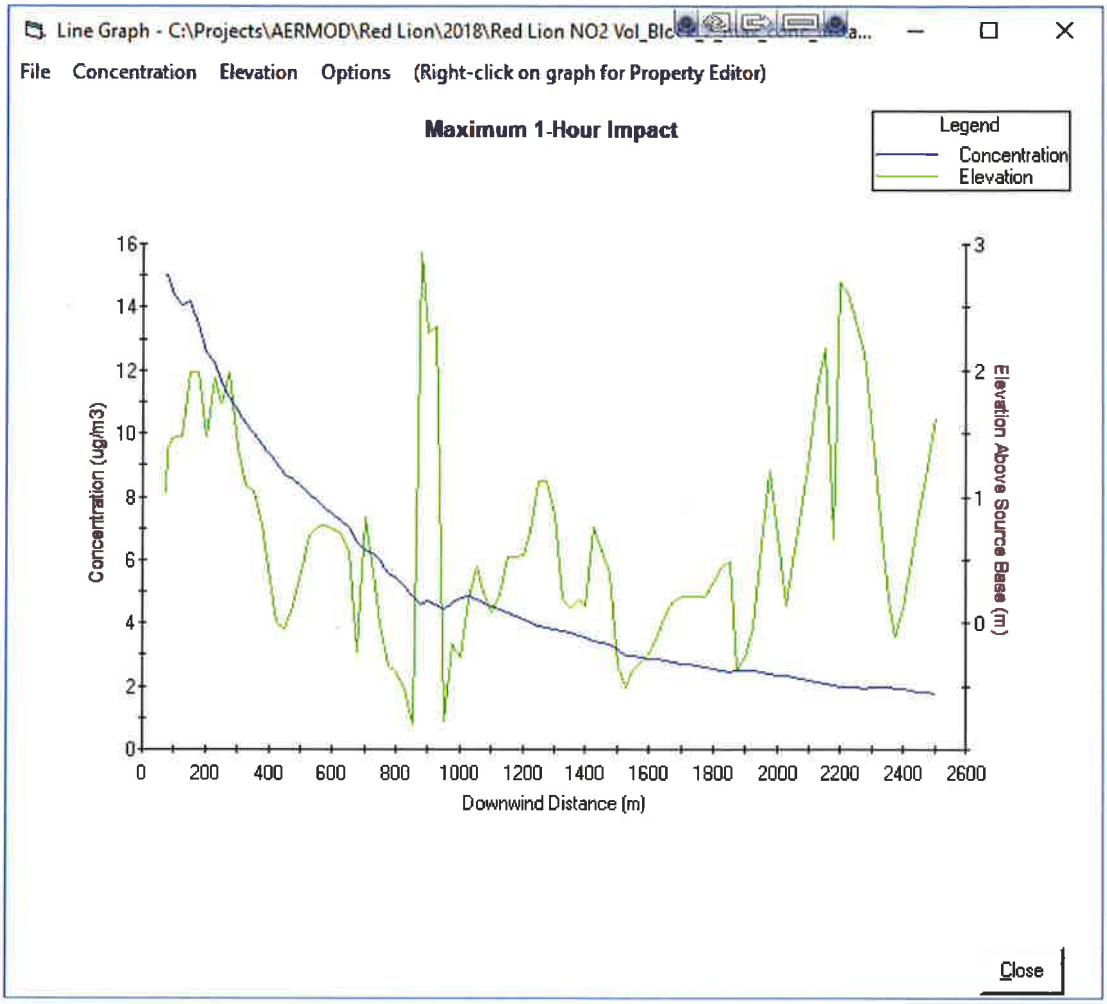
Copy Met
Folder containing intermediate files:
C:\ProgramData\Providence\AerScreen
Close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Maximum 1-Hour Impact
Legend
Concentration
Elevation
Concentration (ug/m3)
Elevation Above Source Base (m)
Downwind Distance (m)
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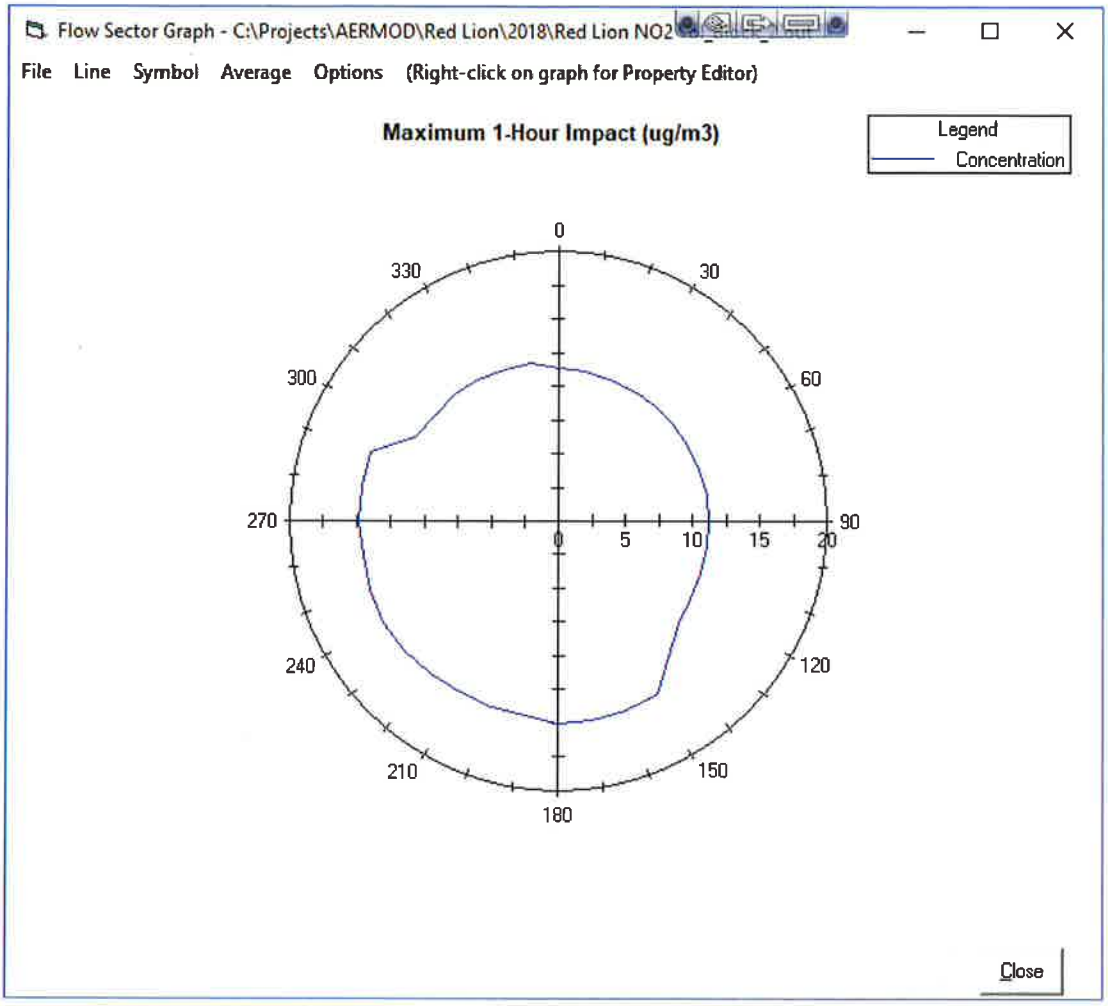
0 2 4 6 8 10 12 14 16
0 1 2 3
Close



If the results for block 1 and block 2 are added together, the maximum 1 hour NOx concentration is 89 micrograms/m3, at a distance of 73.7 meters.

3.2 1-Hour CO

Block 1

AERSCREEN Results

C:\Projects\AERMOD\Red Lion\2018\Red Lion CO Vol_Block_1NW.out

AERSCREEN Finished Successfully

Results

	Max. Conc. (ug/m3)	Dist. (m)
Flow Sector Analysis	450.9000	73.8
Automated Distances	450.9500	73.7

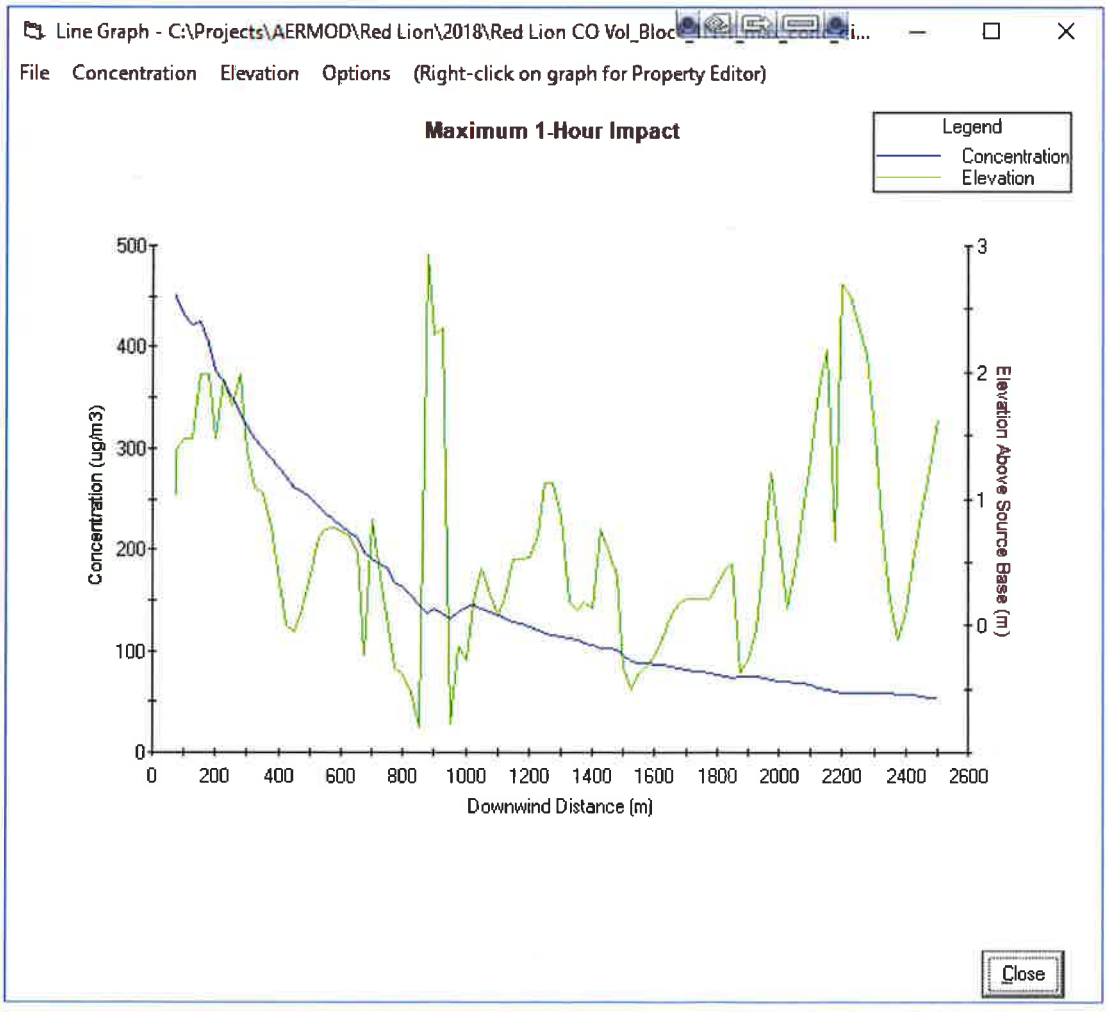
Copy met files to User Folder

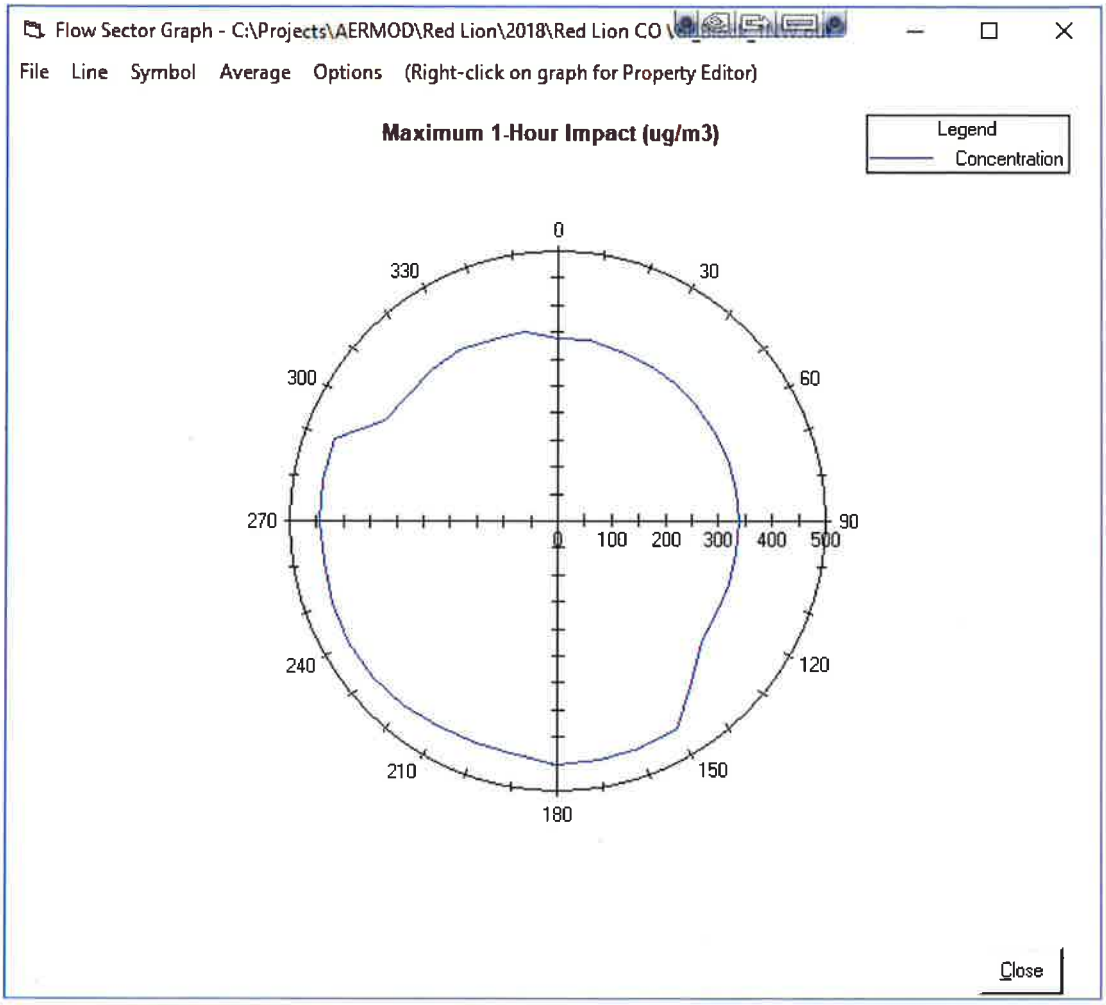
Copy Met

Folder containing intermediate files:

C:\ProgramData\Providence\AerScreen

Close

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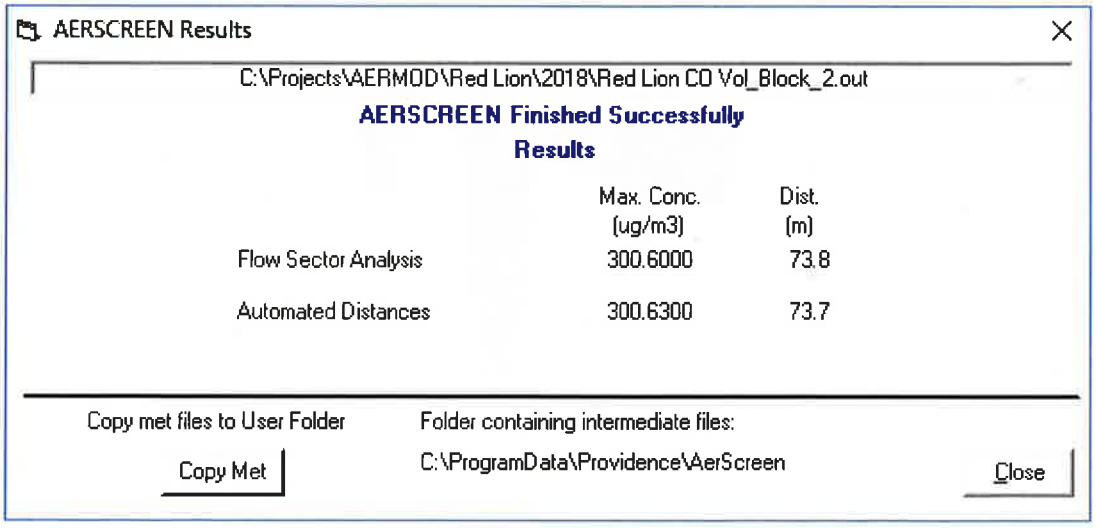
File Line Symbol Average Options (Right-click on graph for Property Editor)
Maximum 1-Hour Impact (ug/m3)
Legend
Concentration
0
30
60
90
120
150
180
210
240
270
300
330
0
100
200
300
400
500
Close

Block 2


AERSCREEN Results
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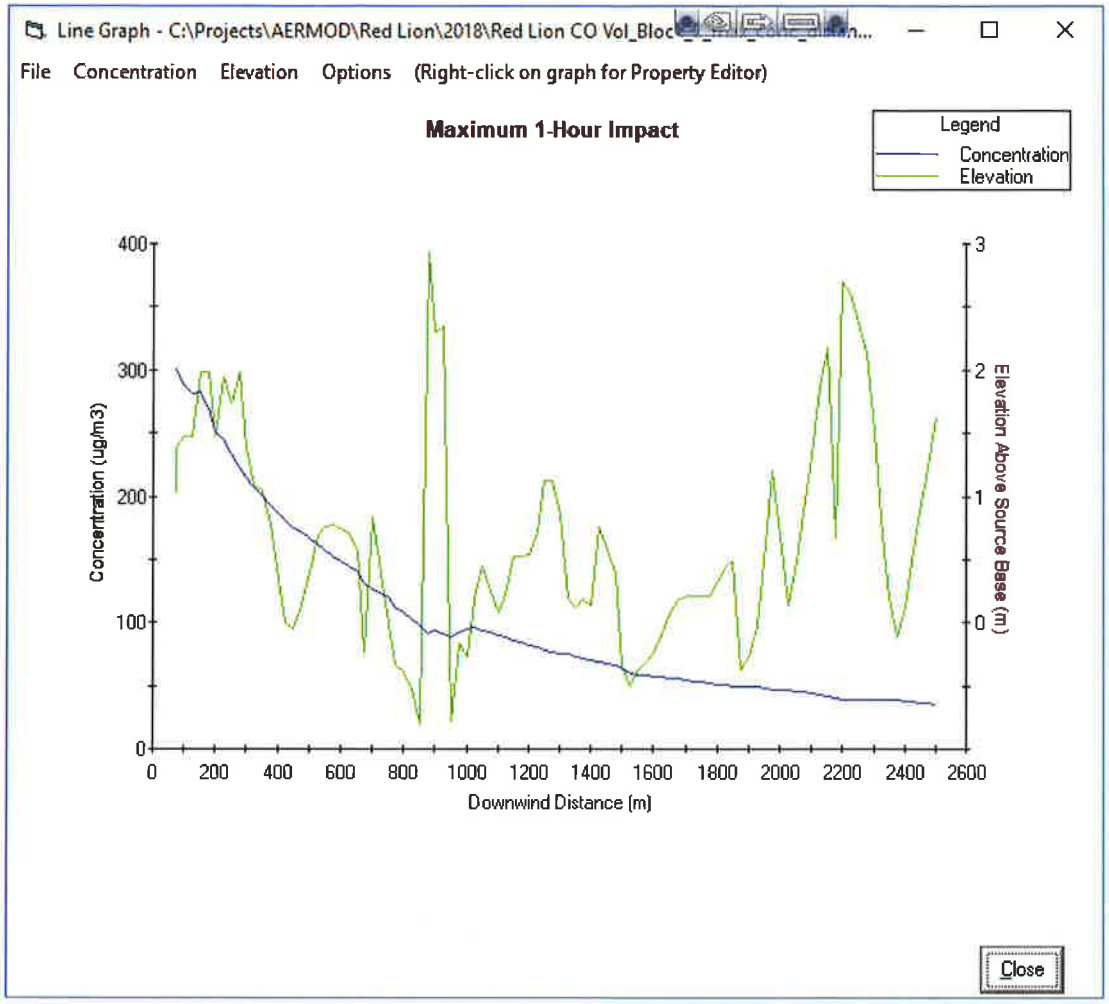
AERSCREEN Finished Successfully
Results
Max. Conc. (ug/m3)
Dist. (m)
Flow Sector Analysis
300.6000
73.8
Automated Distances
300.6300
73.7
Copy met files to User Folder
Copy Met
Folder containing intermediate files:
C:\ProgramData\Providence\AerScreen
Close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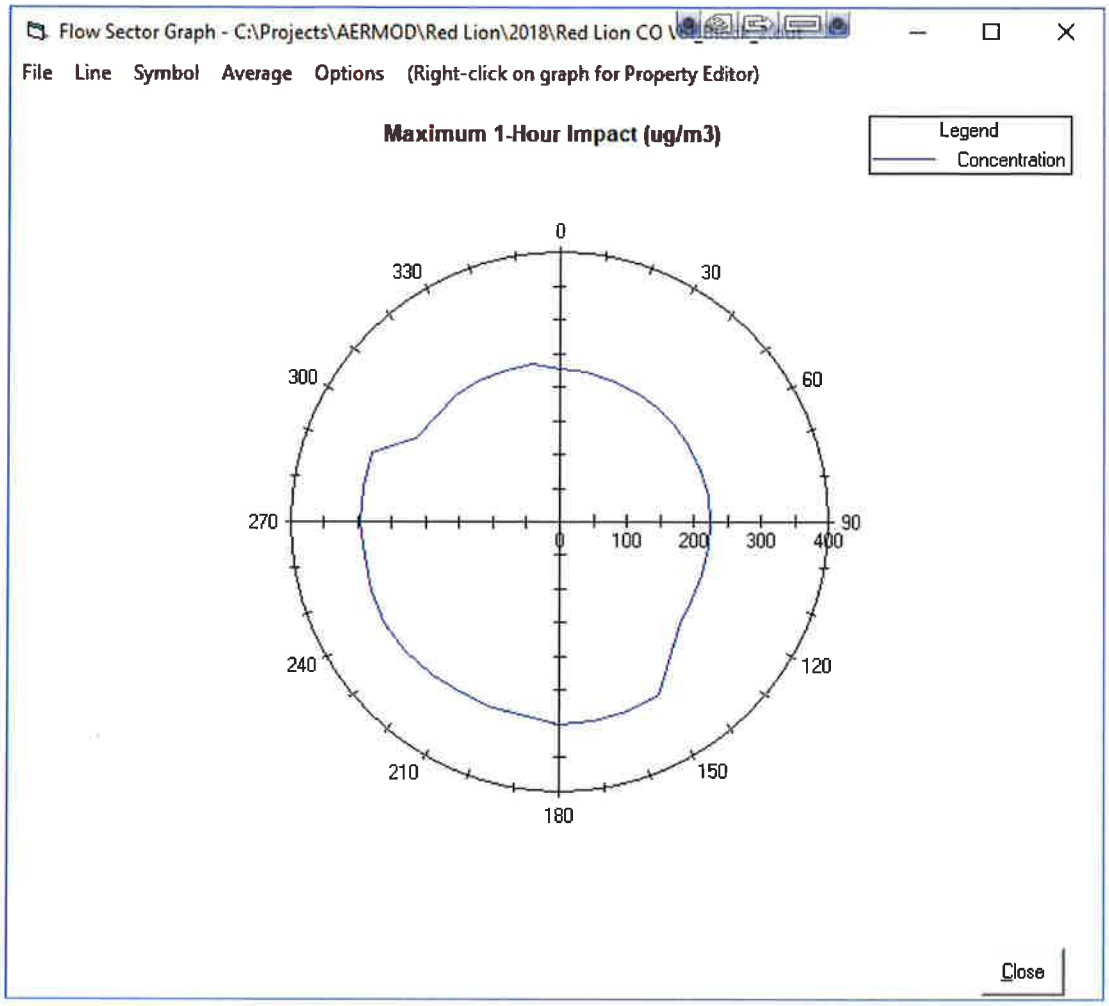
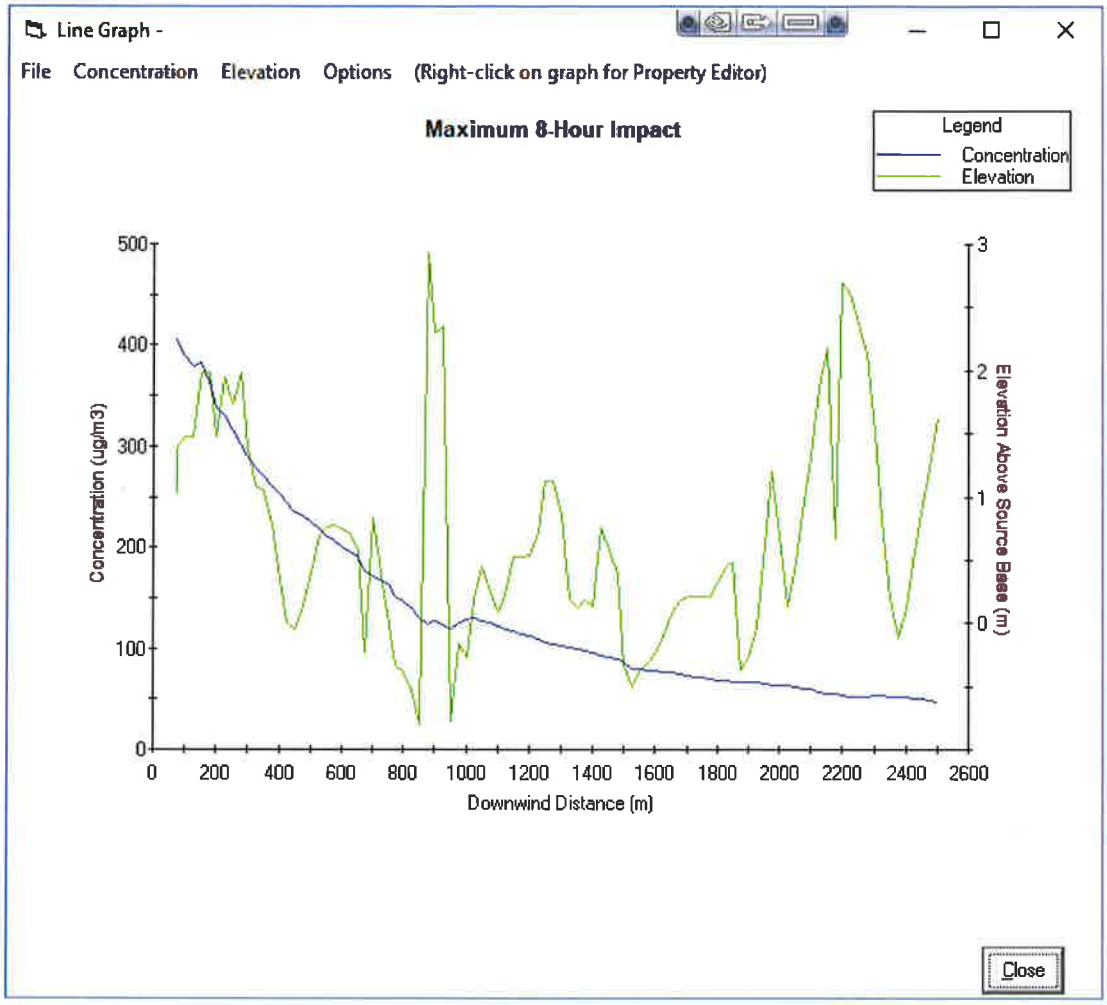
File Concentration Elevation Options (Right-click on graph for Property Editor)
Maximum 1-Hour Impact
Legend
Concentration
Elevation
Concentration (ug/m3)
Elevation Above Source Base (m)
Downwind Distance (m)
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600
0 100 200 300 400
0 1 2 3
Close



If the results for block 1 and block 2 are added together, the maximum 1 hour CO concentration is 751 micrograms/m3, at a distance of 73.7 meters.

3.3 8-Hour CO

Block 1


Line Graph -
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Maximum 8-Hour Impact
Legend
Concentration
Elevation
Concentration (ug/m3)
Elevation Above Source Base (m)
Downwind Distance (m)
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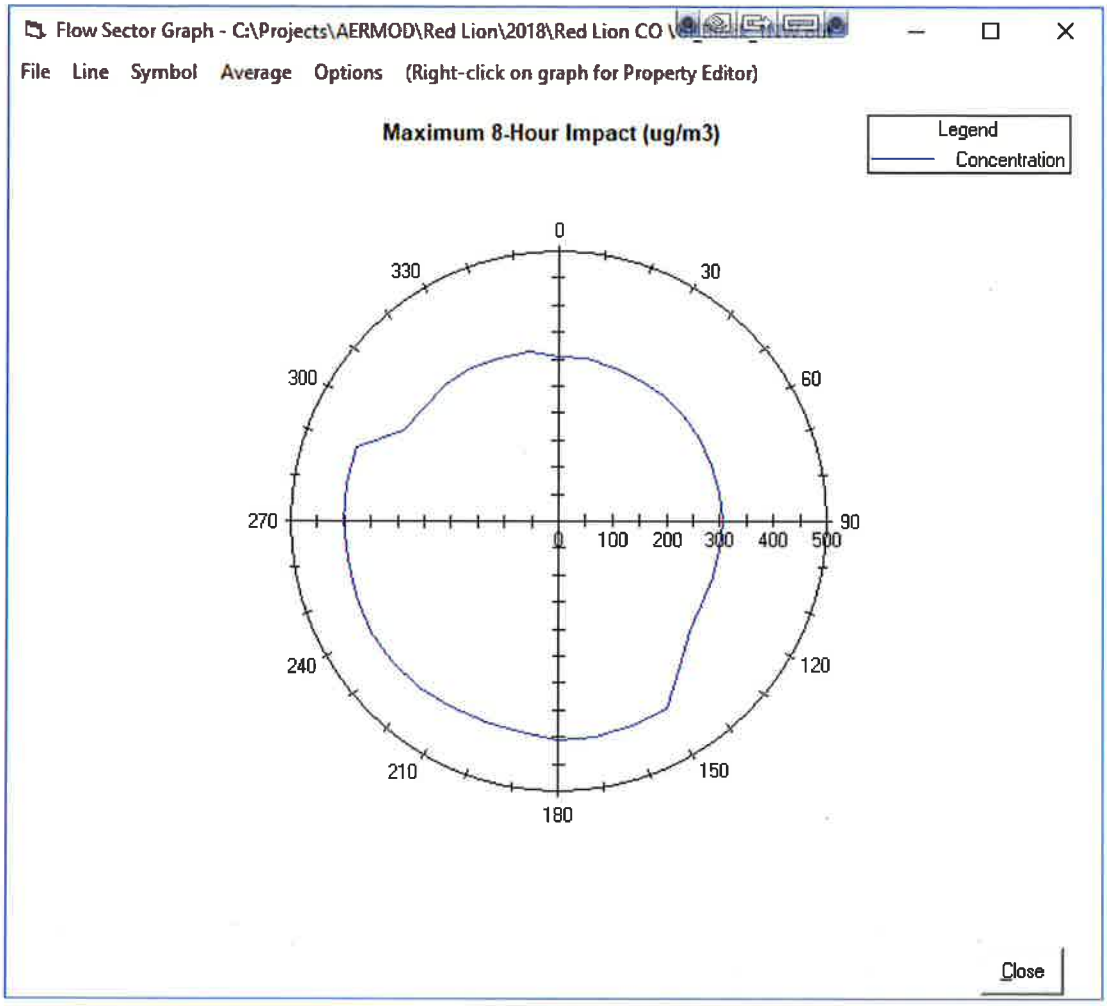
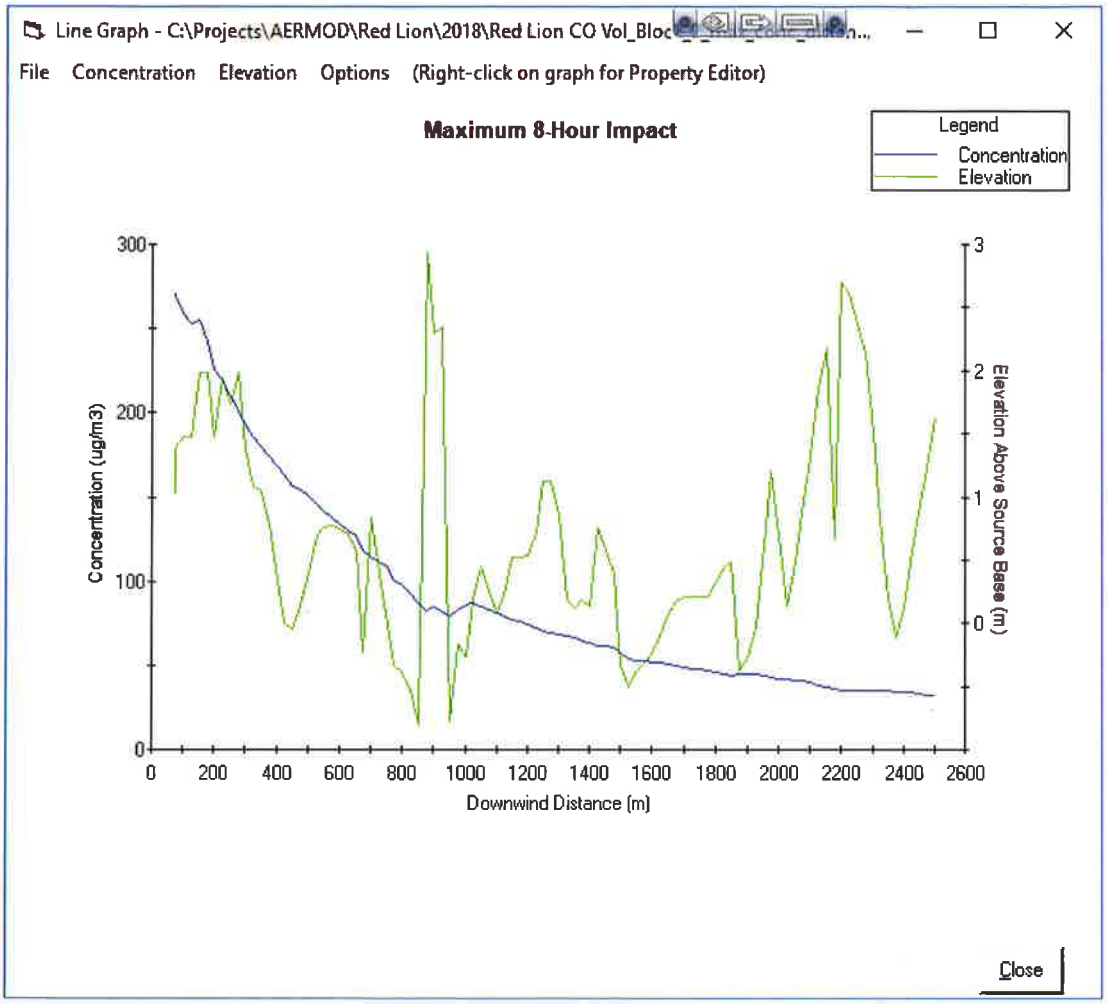
500
0
1
2
3
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600
Close


Flow Sector Graph - C:\Projects\AERMOD\Red Lion\2018\Red Lion CO
File Line Symbol Average Options (Right-click on graph for Property Editor)
Maximum 8-Hour Impact (ug/m3)
Legend
Concentration
0
30
60
90
120
150
180
210
240
270
300
330
0
100
200
300
400
500
Close

Block 2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Maximum 8-Hour Impact
Legend
Concentration
Elevation
Concentration (ug/m3)
Elevation Above Source Base (m)
Downwind Distance (m)
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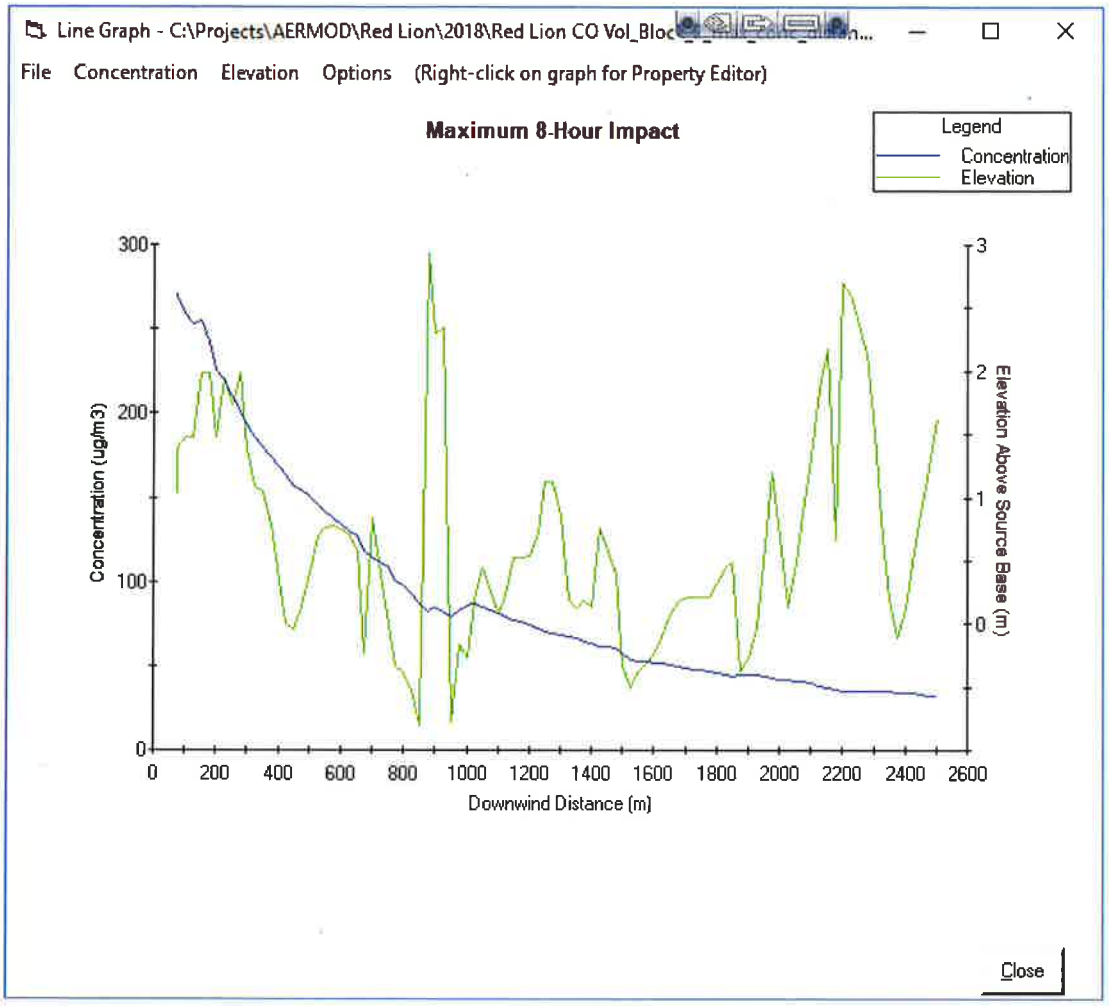
0 100 200 300
0 1 2 3
Close



As expected from AERSCREEN, the 8 hour max result for CO is 90 % of the 1 hour max result for CO.

Attachment X
Red Lion Coastal Permit

DELAWARE
COASTAL ZONE ACT
PERMIT

NUMBER: 394

ISSUED TO: Diamond State Generation Partners, LLC ("Bloom Energy")

TO PERMIT: The installation and operation of 235 fuel cells ("Bloom Boxes") that will utilize pipeline-quality natural gas, providing up to 47 MW of electrical power to the PJM electrical grid.

SITE LOCATION: 1593 River Road, New Castle, Delaware

Conditions Incorporated and Made Part of this Permit:

1. This permit is conditional upon the Permittee's compliance with all other applicable permit requirements, regulations and laws of the State of Delaware.

2. Issuance of this permit does not relieve the Permittee of the legal obligation of complying with all building permits, subdivision and other applicable code requirements of the county or municipality wherein the permitted project is located.

3. If there are significant deviations from the plan and operations approved by the Secretary, the Permittee shall notify the Secretary as soon as possible. This permit may be revoked and a new permit application required if the Secretary deems the deviation to substantially change the nature of scale of the project and to be of actually or probably harm to the purposes of the Coastal Zone Act.

4. The Permittee shall comply with the provisions of the offset agreement by making payment in the amount of $20,000 to the Department on behalf of the Bayshore Initiative restoration efforts within 45 days of the issuance of this permit.

Signature: _____ Date: 30 April 2012

Collin P. O'Mara, Secretary
Department of Natural Resources & Environmental Control

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

OFFICE OF THE
SECRETARY

PHONE: (302) 739-9000
FAX: (302) 739-6242

Secretary's Order No. 2012-CZ-0013

Re: Application of Diamond State Generation Partners, LLC for a Coastal Zone Act Permit for the Red Lion Energy Center at 1592 River Road, New Castle, New Castle County. CZA Project No. 394P

Date of Issuance: **April 30, 2012**
Effective Date: **April 30, 2012**

This Order of the Secretary of the Department of Natural Resources and Environmental Control (Department) provides the following findings, reasons and conclusions following a public hearing on the Coastal Zone Act (CZA), *7 Del. C. Chap. 70*, permit application submitted by Diamond State Generation Partners, LLC (Applicant).[1]

Procedural History

On November 17, 2011, the Department received Applicant's CZA application to use land within the Coastal Zone at 1592 River Road, New Castle, New Castle County for the proposed 'Red Lion Energy Center' (Facility). The Department investigated the application and, in a February 10, 2012, Secretary's Assessment Report, determined that it was administratively complete. Accordingly, the Department provided public notice of the application and a March 6, 2012 public hearing, which was held in the Department's Lukens Drive office in New Castle. The public comment period remained open until March 7, 2012.

[1] A subsidiary of Bloom Energy.

The Department's presiding hearing officer requested assistance from the Department's Coastal Zone Act Program, which on April 4, 2012 provided a memorandum responding to the public comments and a draft permit. In the attached Hearing Officer's Report (Report), dated April 13, 2012, the presiding hearing officer recommends issuance of a CZA permit, subject to permit conditions, as drafted by the Department's Coastal Zone Act Program. I adopt the Report to the extent it is consistent with this Order.

Discussion of Findings and Reasons

The Facility would use 12.44 acres in the CZ to manufacture 47 Megawatts (MW) of electricity. The manufacturing would use 235 Bloomenergy ES-5700 Energy Servers (Bloom boxes), which use natural gas and air to generate electricity without any combustion, but as a result of an electrochemical oxidization reaction similar to producing electricity from batteries.

The Facility would generate electricity constantly, except for any maintenance and repair outages, to deliver 1,128 MWh per day for use by the Pennsylvania-Jersey-Maryland Power Pool (PJM). The Facility's electricity would be transmitted to the nearby Delmarva Power and Light Company's Red Lion substation, where it would enter the PJM grid. The Facility's electricity would be classified under Delaware law as a renewable source of energy.

The Department's review of the application in the Secretary's Assessment found that the proposed manufacturing use would have an environmental impact from air emissions, wastewater, stormwater, water supply, and solid wastes. The Applicant offered as an environmental offset to the negative impacts that the Facility would reduce

air emissions that otherwise would be emitted to produce the 47 MWs that PJM would require from other generating sources. This offset would reduce the discharge of 561,874 pounds of nitrogen oxide (NOx) and 2,227,639 million pounds of sulfur dioxide (SO2) based upon PJM's current average mix of generating capacity, of which fossil fuel sources represent approximately 59%. Applicant's built offset for air emissions would also reduce emissions of particulate matter (PM), volatile organic compounds (VOCs), metals, and hydrocarbons compared to these emissions from all other fossil fuel-fired generating sources. In addition, the Applicant offered a payment of $20,000 for the value of the conversion of 9.3 acres from an agricultural us to a manufacturing use. This amount was calculated by averaging the cost per acre paid by the Delaware Department of Agriculture for farmland within the CZ during recent farmland protection efforts through the Agricultural Lands Preservation Program. The Department will use the payment towards the cost of restoring marshland near the Facility and within the CZ.

The public comments as a result of the public hearing process were fully addressed by the CZA Program's memorandum. Indeed, many of the public comments were addressed at the public hearing by the Applicant. The Department finds that the Facility's negative environmental impacts would be minimal, and would be outweighed by the Facility's economic and environmental benefits. The CZA's purposes allow manufacturing to occur in the CZ if consistent with protecting the CZ for the primary uses, namely, recreation and tourism. The Facility represents the type of suitable manufacturing that should be approved in the CZ.

The proposed use would be manufacturing of electricity and is manufacturing as defined by the CZA. This manufacturing is consistent with allowing the growth of a new

industry, which is a purpose of the CZA. More importantly, the Facility's generation of electricity will be a far more cleaner method of generation than the other fossil fuel-fired sources of generation that represent the dominant type of generation that PJM uses, including coal and natural gas fired generation in the CZ. PJM's use of the Facility as a cleaner source of generation will result in reduced reliance on the other less clean sources, which will result in improved air quality in Delaware in general and in the CZ in particular.

Several of the public comments at the public hearing raised concerns with the Facility's air emissions. The Department shares the public's concerns with air quality. Indeed, use of the Facility's 47 MWs of capacity should improve Delaware's air quality given its vastly cleaner form of generation when compared to PJM's average generating sources, which include zero emission sources. PJM's generating sources now cause much of the air pollution in Delaware and reducing the use of these sources will improve Delaware's air quality. PJM's air emissions from using 47 MWs of its existing generating capacity would discharge 562,739 lb/yr. of Nitrogen Oxide (NOx) and 2,227,652 lb/yr of Sulfur Dioxide (SO2). In contrast, the Facility would release 865 lb/yr of NOx and 14.0 lb/yr of SO2. Thus, the Facility will operate almost 100% cleaner based upon the reduction for these harmful air pollutants than if PJM used its other generation to supply the same amount of energy.

Comparing the Facility's emissions to PJM's average generation mix includes PJM's zero air emission sources, as nuclear, hydroelectric and solar, which makes the offset's use of the PJM average generation conservative. If the Facility displaces some of the 59% of PJM's coal-fired generation or even natural gas-fired generation, then the air

quality improvements would be even greater. Thus, the Facility's use will clearly and demonstrably improve Delaware's air quality as required by the Department's regulation.

The Department's experts found that the Facility's generation of electricity will provide a built in offset because of the significant air quality benefits from using cleaner generation from fuel cells than from PJM's other generating sources. The displacement of PJM's use of its other generating sources will result in better air quality in the CZ. The record contains support in the interstate air transport modeling, and the Department is well aware that much of its air pollution problems stem from PJM generating sources. Thus, Applicant's air modeling is consistent with the Department's own analysis, and supports the Facility's operation to reduce the use of fossil fuel fired generation by PJM.

Even without the PJM based offset, the Facility's air emissions will be lower than other types of manufacturing in the CZ, especially the emissions from electric generation. Without question the generation of electricity is a use needed in the CZ because it, like other utility services, is needed to support the CZ's primary use for recreation and tourism. The Hearing Officer's Report notes that the CZA Regulations provide electricity generation special treatment by exempting emergency generators and solar generation. Thus, on balance, the Department finds that the environmental impacts from the Facility have been addressed, and that the Facility's use for manufacturing is not contrary to the CZA and should be permitted.

The Department also will continue to monitor the Facility's operations pursuant to its other regulatory permit programs. The Facility's air emissions will be subject to the regulation under Department's Regulations Governing the Control of Air Pollution. Similarly, the Department will regulate the Facility's use of water supply under its

Regulations for wells and water supply. The Facility's wastewater treatment and disposal also will be subject to the Department's regulation and permitting. Finally, the Applicant will be installing three bioretention areas, which will reduce the amount of stormwater runoff from current levels. These regulated activities provide further support for issuance of a CZA permit to allow the Facility's use as an appropriate type of manufacturing by a new industry in the CZ consistent with the CZA's goals.

Conclusions

Accordingly, I direct that the permit be issued to the Applicant, subject to certain conditions, and enter following conclusions:

1. The Department has jurisdiction to issue a CZA Permit to the Applicant subject to reasonable permit conditions deemed appropriate and consistent with the CZA's purposes;

2. The Department provided adequate public notice of the proceeding and the public hearing in a manner required by the law and its regulations;

3. The Department held a public hearing in a manner required by the law and its regulations;

4. The Department considered all timely and relevant public comments in making its determination;

5. The Department carefully has considered all the statutory factors to be considered in making a decision on a CZA permit application under the CZA and its regulations; and

6. The Department shall publish legal notice this Order and otherwise provide notice as to all affected persons in a manner consistent with the public notice

required by the law and the Department regulations, and shall post on the Department's web site.

Collin P. O'Mara
Secretary

HEARING OFFICER'S REPORT

TO: The Honorable Collin P. O'Mara
Secretary, Department of Natural Resources and Environmental Control

FROM: Robert P. Haynes, Esquire
Senior Hearing Officer, Office of the Secretary
Department of Natural Resources and Environmental Control

RE: Application of Diamond State Generation Partners, LLC for a Coastal Zone Act Permit for the Red Lion Energy Center, 1593 River Road, New Castle, New Castle County (CZA Project No. 394P)

DATE: April 13, 2012

I. PROCEDURAL HISTORY

This Report makes recommendations to the Secretary of Department of Natural Resources and Environmental Control (Department) on Diamond State Generation Partners, LLC's (Applicant) Coastal Zone Act [1] (CZA) permit application. Applicant seeks permission to use the Coastal Zone[2] for manufacturing by constructing and operating the Red Lion Energy Center (Facility) at 1593 River Road, New Castle, New Castle County.

In a February 10, 2012, Secretary's Assessment, the Department determined that the application was administratively complete, and provided public notice of the application and a public hearing. I presided over the March 6, 2012 public hearing, and the public comment period was extended until March 7, 2012 based upon an unopposed request. On April 2, 2012, I requested the Department's CZA Program for assistance, which the CZA Program provided in the attached April 4, 2012 memorandum.

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[1] *7 Del. C. Chap. 70.*
[2] A geographic area defined by the CZA.

II. SUMMARY OF THE RECORD

This Report is based upon the following record: 1) the documents introduced as exhibits at the public hearing, 2) the verbatim transcript of the public hearing, and 3) the information in this Report and the documents identified herein.

At the public hearing, Kevin Coyle, the CZA Program's principal planner, submitted the following documents[3] from the Department's files: DNREC Ex 1-Applicant's November 17, 2011 CZA application; DNREC Ex. 2 & DNREC Ex 3-affadavits of publication of public notice of the receipt of the November 17, 2011 application; DNREC Ex. 4- Applicant's November 29, 2011 email to CZA Program on PJM air emissions; DNREC Ex. 5- Applicant's January 3, 2012 email on the farmland conversion offset; DNREC Ex. 6- Applicant's January 18, 2012 email to CZA Program on air emissions; DNREC Ex. 7-CZA Program's January 20, 2012 email to Applicant on air emissions; DNREC Ex. 8-the February 10, 2012 Secretary's Environmental Assessment Report; DNREC Ex. 9 & DNREC 10-affadavits of publication of public notice that the application was complete and the March 6, 2012 public hearing.

The Applicant's counsel, Shawn Tucker, Esquire, made introductory comments in which he indicated that Applicant was a wholly owned subsidiary of Bloom Energy. He also began a Powerpoint presentation, which was entered into the record. Diamond State Generation Partners Ex. 1. The presentation noted that the Facility would be located on a 42 acre parcel, but that the Facility would only lease 12.44 acres, of which only 9.3 acres would be used for manufacturing. He stated that the proposed use would disturb the existing young and mature forest and would result in the loss of farm land. He described the Applicant's proposed offset for the land use's conversion to manufacturing by a payment of $20,000 to the Department, which was calculated from a $2,118 average per acre price of farmland within the Coastal Zone. Finally, he explained

[3] The Department provides documents for the record at the public hearing solely to assist the public in making public comments. The Department does not have a burden of proof to develop a record during the public hearing.

that the electric generation of 47 MW would occur in two phases from 235 Bloom boxes, and the initial installation would generate 27 Megawatts (MWs).

The Applicant's Vice-President, Bill Brockenborough, continued the Powerpoint presentation by describing the Bloom boxes as each having a capacity of 200 kilowatts. He described the size of each box as 25' long, 8' wide, and 6.5' high. He pointed out that the Bloom boxes only moving parts are circulating fans for moving air and were very quiet when operating. He explained how electricity is generated by electrochemical reaction between the fuel cells, air and natural gas, and that no combustion occurs. He stated that the principal emissions were water and sulfur dioxide (SO2).

Jeff Bross of Duffield Associates, Applicant's consulting engineers, explained the offset proposed for the air emissions. This offset is based upon the cleaner form of electrical generation from the Bloom boxes compared to the other generating sources that use fossil fuels and sell electricity to the PJM Power Pool (PJM). He described how the generation from Bloom boxes would displace the use of the other fossil fuel sources that sell to PJM and that the use of Bloom boxes would result in an almost 100% reduction of SO2 and NOx emissions compared to the PJM average generating emissions, which includes nuclear, hydro, and wind power that like Bloom boxes also generate electricity with little emissions. He mentioned the release of CO2, which he stated is not regulated. Nevertheless, he indicated that Bloom boxes released far less CO2 than other generating sources that use fossil fuel fired combustion.

The Powerpoint presentation provided information previously in the application on emissions showing the 99.99% reduction in SO2 emissions, the 99.8% reduction in NOx emissions, and the far lower emissions for 14 other regulated air emissions compared to oil, natural gas or coal fuel fired generating units that PJM otherwise would use. The presentation provided air transport information on how the fossil fuel fired generating stations that would be

subject to displacement adversely impact the air quality within the CZ. Applicant's presentation ended by noting the Bloom boxes' clean exterior appearance.

The first member of the public to speak was John Nichols, who presented a California study that compared energy savings and emissions from Bloom boxes with the energy and emissions from a gas-fired co-generation boiler. Nichols Ex. 1. Mr. Nichols questioned the application's use of average PJM electric generating sources for the air emissions reductions. He suggested that a weighted average should be used, which he said would reduce the PJM's average emissions. He also questioned whether the Applicant disclosed all materials that may be hazardous substances in the application, and cited various materials as possibly hazardous. He also questioned whether the payment of $20,000 for the conversion of farmland to industrial use was an appropriate amount. He also raised an issue with possible sea level rise and inundation of the area to be used. Representatives of the Applicant provided answers to Mr. Nichols's questions. Mr. Nichols provided the following documents for the record: Nichols Ex. 1-Discussion paper (Issues on Carbon Footprint and Public Expenditures for Bloom Energy Fuel Cell v Natural Gas Fired Co-Generation; Nichols Ex 2-Article (Market Impacts of Rare Earth Element Use in Solid Oxide Fuel Cells); Nichols Ex. 3 Article (Effect of cerium nanoparticles on inflammation in vascular endothelial cells); Nichols Ex 4 Material Safety data Sheet for Cerium Oxide; and Nichols Ex. 4 (Occupational Safety and Health Administration's Guidance for Identification and Control of Safety and Health Hazards in Metal Scrap Recycling).

Elizabeth Brown spoke as director of strategic initiative and counsel with the Delaware Riverkeeper. She indicated that the Delaware Riverkeeper organization does not oppose or support the permit application. She was concerned with the proposed use of fossil fuel from natural gas. She cited the CZA Regulation for environmental impacts and the requirement to offset negative impacts, which she suggested should include natural gas facilities. She

questioned whether the Applicant properly evaluated the environmental impact from water usage and discharge of process water. She indicated that the application should disclose the natural gas sources. In response, the Applicant indicated that the Facility would use gas from Delmarva Power & Light's gas utility facilities. She asked about the life cycle of the facility and the Applicant replied that the life cycle was 22 years. She also asked about the repair and maintenance of the facility, and Applicant replied that it would occur in a small building at the site..

Brenna Goggin from the Delaware Nature Society provided comments that questioned the use of the Bloom boxes as an offset that is required by the CZA Regulations. Her written comments were admitted as DNS Ex. 1.

Simon Hahn provided comments that asked whether there had been any consideration of an alternative location that would reuse a brownfields site. He also questioned the Facility's use of groundwater because of possible contamination from the nearby Metachem site. He also asked about the stormwater impact and the offset for farmland conversion, and Applicant replied stating the stormwater management proposed would properly control all stormwater.

Mr. Nichols provided an additional comment that claimed a missing letter from the Department's Natural Heritage program required that the application be rejected. He also requested one day extension of time to submit additional comments, which was granted.

Mr. Nichols provided an additional comment by email on March 7, 2012 that requested the application be denied because of the missing letter from the Natural Heritage Program and possible adverse impact to wildlife. This will be in the record as Nichols Ex. 6. In addition, Richard Fleming submitted by e-mail comments that question the offset for farmland loss and for air emissions, and this comment shall be in the record as Fleming Ex. 1.

I requested assistance from the Department's experts, and the CZA Program provided the attached memorandum that comprehensively responds to all the public comments. It notes the offset would occur from the generation, which would release emissions that could be considered negligible in terms of environmental impact. It notes that the release of carbon dioxide, while currently not regulated by the Department's air pollution control regulation, nevertheless should be considered an environmental impact under the CZA Regulation. The memo finds that this impact, however, would be more than offset by the Bloom boxes' operation, which also produce far less CO2 than use of other forms of fossil fuel-fired generation.

III. DISCUSSION OF FINDINGS AND REASONS

I find that the record supports the issuance of a CZA permit, submit to the conditions recommended by the CZA Program in its draft permit.

The Facility's location will be on Delmarva Power & Light Company's New Castle County tax parcel No. 100.50.00011 within the CZ.[4] Applicant has leased 12.44 acres. The parcel was leased to a farmer for use for farming.

New Castle County has zoned the land 'Suburban,' but Applicant's proposed use "of power cells to generate electricity without combustion via chemical reaction between natural gas and certain metals as a minor utility and permitted as a limited use" was approved for use in the Suburban zoning district. The area to be developed is outside the 100 year floodplain and will not disturb any wetlands and stormwater management will use green technology with 3 bio retention areas that should reduce the current conditions' stormwater runoff.

Applicant proposes to install 235 Bloom boxes[5] on 9.3 acres and build support facilities on 3.1 acres. Bloom boxes are fuel cells that will use natural gas, water, and air to generate electricity by electrochemical reaction similar to the generation of electricity from batteries. The

[4] This is a 42 acre parcel.
[5] Bloomenergy ES -5700 Energy Servers

Bloom boxes will produce a maximum of 47 Megawatts of electricity, which will be transmitted to the nearby existing Delmarva Power & Light Company electric utility substation where the electricity will be purchased by the PJM Power Pool. The natural gas will be from Delmarva Power & Light Company's existing natural gas lines that are located adjacent to the Facility's site along River Road. The Facility will install a Department approved on-site wastewater treatment and disposal system for the small amount of use from the process water used and from use by employees. The Facility's water supply for domestic and process use will be from a Department approved well to ensure environmental concerns are satisfied, including any possible contamination in the groundwater.

Based upon the description of the equipment to be used, its potential to pollute and the overall appearance of the proposed manufacturing, I find that the proposed manufacturing use will not be a CZA prohibited "heavy industrial use" because the amount of land used for manufacturing is less than 20 acres, and more importantly, the manufacturing process will lack the CZA's characteristics of a "heavy industrial use."[6]

The Facility will operate constantly to generate electricity except for scheduled or unscheduled outages for maintenance and repair. The Facility will require approximately 50 workers for its construction, and will require 15 employees for its operation. The total estimated construction cost is $2.5 million, and the estimated annual wages and salaries of the operations employees will all exceed $50,000. In sum, the Facility will result in the creation of new jobs

[6] The CZA defines heavy industrial use as "a use characteristically involving more than 20 acres, and characteristically employing some but not necessarily all of such equipment such as, but not limited to, smokestacks, tanks, distillation or reaction columns, chemical processing equipment, scrubbing towers, pickling equipment and waste-treatment lagoons; which industry, although conceivably operable without polluting the environment, has the potential to pollute when equipment malfunction or human error occurs."

and the type of industry that the CZA encourages,[7] and the Facility represents the type of manufacturing use in the CZ that the Department should permit under the CZA.

The Applicant sets forth the possible negative impacts from the proposed use. The Department's experts reviewed the negative impacts and found nothing to warrant a permit denial. Indeed, the Department's expert view the negative impacts as somewhat negligible. The record supports finding that the proposed use will, after the offsets, have no overall negative environmental impact on the CZ. I agree that the Bloom boxes represent a cleaner method to generate electricity than if coal, oil or natural gas were used, which are the predominate methods that the PJM relies upon for its generating supply sources. Thus, to the extent the Bloom boxes operate, they will displace these other less clean generating sources.

The Applicant estimates the annual electrical output of 411, 720 MWh will result in the displacement of PJM sources that emit at least 1113.8 tons of SO2, 280.9 tons of NOx, and 6115.8 tons of carbon dioxide. In addition, the Facility's CO and VOC emissions would be far lower than PJM's other fossil fuel fired generating sources.

The possible negative impacts from the Facility were fully examined by the Department, including the consequences of any accident or malfunction. The Bloom boxes' release of air emissions in particular was the subject of the Department's extensive analysis even though the releases are relatively small compared to other industrial uses in the CZ. The Secretary's Assessment determined that air modeling provided sufficient support that the reduced emissions from other less clean PJM generating sources would result in cleaner air in the Coastal Zone. Department's experts accepted the Applicant's analysis that any additional air emissions from

[7] While it is the declared public policy of the State to **encourage the introduction of new industry into Delaware**, the protection of the environment, natural beauty and recreation potential of the State is also of great concern. **In order to strike the correct balance between these 2 policies, careful planning based upon a thorough understanding of Delaware's potential and her needs is required. Therefore, control of industrial development other than that type of heavy industry in the coastal zone of Delaware through a permit system at the state level is called for.** *7 Del. C. §7001(emphasis supplied).*

the Bloom boxes would be offset by the reduced air emissions from PJM's other fossil fuel fired generating sources. In effect, the operation of the Bloom boxes provide a cleaner source of electricity than if PJM used other fossil fuel fired generation. Hence, the cleaner source of generation compared to PJM's other fossil fuel-fired sources means that the Bloom boxes will provide a "built in" offset whenever they operate.

I agree with the analysis and the underlying assumptions and facts in this record support a finding that when the Bloom boxes generate electricity, they automatically will displace PJM's use of far less clean generating sources, particularly from coal, oil and natural gas. This assumption was supported in the record by the present PJM's generating sources, which show a majority are from coal, oil and natural gas generating stations. I find the record supports the "built in" offset as consistent with the nature and type of offset that will clearly and demonstrably more beneficial to the CZ environment, as required by the CZA Regulation 9.1.1.

> Any application for a Coastal Zone permit for an activity or facility that will result in any negative environmental impact shall contain an offset proposal. Offset proposals must proposals must more than offset the negative environmental impacts associated with the proposed project or activity requiring a permit. It is the responsibility of the applicant to choose an offset project that is clearly and demonstrably more beneficial to the environment in the Coastal Zone than the harm done by the negative impacts associated with the permitting activities themselves.
>
> *Section 9.1.1 of CZA Regulations.*

Bloom boxes' cleaner generation of electricity for use by PJM will cause PJM to reduce its reliance on other generating sources. The record indicates that in 2010 PJM relied upon 48% from coal fired generation and 11 % from natural gas fired generation. Both of these sources emit far greater emissions than Bloom boxes. The Bloom boxes' operation will displace PJM's use of other fossil fuel-fired sources and provide cleaner air emissions than these sources. I find that Applicant's use of average PJM generating sources to measure the air quality benefit is conservative because the PJM average emissions includes PJM's essentially zero air emission

sources such as hydro, wind, solar and nuclear sources. If the Bloom boxes displace only fossil fuel-fired sources, based upon PJM's 59% usage of fossil fuel-fired generation, then the Bloom boxes relative air emission benefit to the CZ would increase. I find that using PJM's weighted average generation would not change the Bloom boxes environmental benefit, particularly when compared to coal and natural gas. Moreover, the use of nuclear power for generation, while 'clean' in its air emissions, poses other environmental problems from its waste disposal and hydroelectric generation also poses water quality concerns. I find ample support in the record that the use of Bloom boxes by PJM as a source of generation will result in far lower air emissions than from 59% of PJM generation sources. Thus, the lower air emissions from Bloom boxes, as compared to other fossil fuel-fired generation, will improve the air quality in the CZ based upon sound interstate air transport models, which establish that PJM's use of fossil fuel-fired generation adversely impacts Delaware's and the CZ's air quality.

The issuance of a CZA permit for the Bloom boxes also is supported by Delaware's classification of this form of generation as a "renewable." This classification supports the deployment of Bloom boxes as consistent with the Delaware policies to encourage the use of renewable energy sources. I note that the CZA Regulation recognize the need for new sources of electricity generation in the CZ by exempting emergency generators and solar generation from the need to obtain any CZA permit. I find that these exemptions support the Facility's issuance of a CZA permit as consistent with the recognition that electricity is needed and renewable energy in particular poses benefits that should be encouraged. To the extent that more cleaner energy generation in the CZ is approved, then Delaware will have less need to rely upon fossil fuel fired generation, including the reliance on the two older large coal fired generating stations that operate under the CZA's exemption for existing heavy industrial uses because they began operation prior to when the CZA went into effect.

I find that the Facility's operation will dramatically reduce PJM's air emissions from coal and natural gas-fired generation that now adversely impacts the CZ's air quality, particularly from SO2 and NOx. Delaware's air quality for New Castle County is impaired and Delaware is required to take such regulatory actions to improve air quality. The approval of Bloom boxes will reduce the operation of PJM coal and natural gas fired generating stations, including reduced use of coal fired generation in the CZ, and this reduction will result in clean air quality in the CZ.

In the interest of furthering the Department's review, the Applicant added an environmental impact for the conversion of farmland to industrial use. As noted by the CZA Program, the possible negative environmental harm from the conversion of farmland to industrial use has not been subject to an offset before in CZA permits. Indeed, the application cites the water quality benefits from the conversion, which may protect the water from harmful agricultural application of chemicals. I agree the land development for industrial use could be considered as a negative impact. While I agree that use of a brownfield site would be preferable location, the site selected nevertheless satisfies the CZA for a manufacturing use, particularly given the low environmental impact from the proposed manufacturing. The CZA allows the Applicant to select a site, and the record provides no support for intruding upon Applicant's managerial discretion in selecting the site. Indeed, the Facility's location near the electric substation and on land that Delmarva Power and Light owns, presumably for use in its public utility operations, supports the approval of the site as a reasonable use. I find the offset for farmland conversion provides an ample environmental benefit to supplement the vast air quality benefit provided by the Bloom boxes displacement of less clean generation. The CZA Program investigated the valuation with the assistance of the Department of Agriculture and found that the valuation was appropriate. I agree. In sum, the Department will use the farmland conversion

offset in the CZ for projects that will improve the natural habitat, which, in turn, will improve the water quality, air quality and overall environment within the CZ.

The CZA's second consideration is the proposed economic effect and the Facility will have a positive economic impact by its construction activity and ongoing employment. I find the positive economic benefit, as described herein, provides justification for a permit as consistent with the CZA's purpose to encourage appropriate industrial development in Delaware. The creation of a fuel cell generating facility will provide good jobs during the construction and during the operation over more than twenty years.

The third CZA consideration is the number and type of supporting facilities required and their impacts on all other factors. The Facility will require little support facilities. In addition, the site's close proximity of the gas and electric utility infrastructure will reduce the need for construction of these facilities to reach the site. Thus, the support facilities will not cause any undue adverse impact on the environment.

The fourth CZA consideration is aesthetic. The Facility will be visible from the street, but the Bloom boxes are not conspicuous or even appear like any traditional method of manufacturing, particularly the generation of electricity. Instead, the Bloom boxes will look more like heating and air conditioning units often located next to commercial buildings. The Facility will have landscaping to provide a less industrial appearance than most industrial use sites in the CZ. Thus, the Facility satisfies this CZA consideration.

The fifth consideration is the effects on neighboring land uses, and the Applicant states that there would be no adverse impacts on the closest residential property. I agree based upon the overall negligible impacts and appearance..

The sixth consideration is that Facility will be consistent with county and municipal comprehensive plans, which Applicant satisfied by proof of New Castle County's approval of the Facility's use consistent with local planning authority.

I find that the Department should issue Applicant the permit because the Facility will be consistent with the type of manufacturing that the CZA allows. The Facility is also consistent with the Department's efforts to permit responsible industrial manufacturing uses within the CZ in a way that will provide good employment opportunities and safeguard the CZ for recreation and tourism uses. More importantly, the Facility will promote the type of electricity generation that is consistent with Delaware's energy policies and the use of a renewable resource as defined by Delaware law. Based upon the record, I find that a CZA permit should be issued, subject to such reasonable permit conditions to ensure that the permit is consistent with the CZA, the Department's regulations and policies, and the Department's statutory purposes and policies.

IV. CONCLUSIONS

I find and conclude that the record supports approval of the permit, and recommend that the Secretary adopt the following conclusions:

1. The Department has jurisdiction to issue a CZA Permit to the Applicant subject to reasonable permit conditions deemed appropriate and consistent with the CZA's purposes;

2. The Department provided adequate public notice of the proceeding and the public hearing in a manner required by the law and its regulations;

3. The Department held a public hearing in a manner required by the law and its regulations;

4. The Department considered all timely and relevant public comments in making its determination;

5. The Department shall issue a permit to the Applicant in the form and manner proposed by the CZA Program in its draft permit;

6. The Department carefully has considered all the statutory factors to be considered in making a decision on a CZA permit application under the CZA and its regulations; and

7. The Department shall publish legal notice this Order and otherwise provide notice as to all affected persons in a manner consistent with the public notice required by the law and the Department regulations, and shall post on the Department's web site.

Robert P. Haynes, Esquire
Senior Hearing Officer

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April 4, 2012

TO: Mr. Robert P. Haynes, Esq.

FROM: Lee Ann Walling, AICP
Kevin Coyle, AICP CEP

RE: Coastal Zone Act Program response to Bloom hearing

This memo attempts to answer questions and comments raised during Diamond State Generation Partners' (Bloom Energy) Coastal Zone permit hearing on March 6, 2012. Before delving into individual issues presented during the hearing, we believe it is important to make several introductory points:

- Before determining that Bloom's Coastal Zone permit application was "preliminarily administratively complete" on February 10, 2012, we conducted meetings, phone conversations and exchanged information electronically with Bloom. The meetings included, in particular, representatives of the Division of Air Quality.

  The conversations and information exchanges resulted in validation by DNREC of Bloom's emissions estimates and the additional proposal of $20,000 to offset the loss of 9 acres of farmland. There is some debate about the appropriate value of this farmland (to be addressed later in this document). However, to our knowledge, such an offer is unique; no Coastal Zone applicant has ever been expected or has offered to offset the loss of agricultural lands. In addition, Bloom points out that its proposed use and intention to use green stormwater best management practices are a likely environmental improvement over traditional agricultural practices at the site.

- In that determination of February 10, 2012, DNREC essentially accepted Bloom's assertion that the 47 MW of "clean" energy generated at the Red Lion site represented a built-in offset, displacing dirtier (fossil fuel)

electricity generation on the PJM grid. Bloom was asked to provide more scientific backup at the March 6 hearing, and the company attempted to do so. Its presentation has been posted to the Coastal Zone program website, http://1.usa.gov/wzHF70.

- Bloom's "built-in" offset proposal prompted questions at the hearing. Even if an individual rejects Bloom's offset logic, the company's emissions of regulated air pollutants can be considered negligible in terms of environmental impact. There will be no emissions of particulates. Estimates for NOx and sulfur dioxide are 1.4 and 0.02 pounds per day, respectively. Volatile organic compounds (VOCs) are 13 pounds per day and carbon monoxide emissions are 65 pounds per day, according to the Division of Air Quality. There are no emissions of Hazardous Air Pollutants (toxics or carcinogenics). Bloom clearly presents a technology with exponentially better environmental results than conventional fossil fuel generating plants.

- We also note that the offset requirements in the Coastal Zone Act regulations do not distinguish between regulated and unregulated environmental impacts. Section 9.1.1. states: *"Any application for a Coastal Zone permit for an activity or facility that will result in any negative environmental impact shall contain an offset proposal."* For example, past Coastal Zone permits have imposed conditions relating to certain ecological impacts that are not regulated.

  In addition, carbon dioxide currently may not be regulated but still presents an environmental impact. However, in accepting Bloom's "built-in" offset argument, DNREC has determined that the project's CO_2 emissions are being more than offset.

We will now address the additional issues raised at the March 6, 2012 public hearing:

Thermal energy. Mr. John Nichols asserted that the Bloom proposal does not account for the need for thermal energy, the heating and cooling of buildings, and therefore underestimates carbon dioxide emissions. The Coastal Zone Act is focused only on electricity generation as a manufacturing process. Homes and offices will need to be heated and cooled, whether with electricity provided by a coal-fired plant or by Bloom. Homes and offices are not covered by the Coastal Zone Act.

Weighted average. Mr. Nichols notes that Bloom, in comparing its emissions to other types of generation – fossil fuels, nuclear, wind – should have used a "weighted average" to determine its relative environmental benefit. Bloom clearly stated that they were including nuclear and wind generation, which do not generate SOx and NOx emissions, in the PJM average. If the company did use a weighted

average, Bloom would look comparatively even better since coal-fired plants comprise 50 percent of the PJM grid generation, and wind provides only a small percentage (1.3 percent in 2010).

Rare earth elements. Mr. Nichols also expressed a concern, and provided several reports, about the presence of rare earth elements in Bloom's fuel cells – specifically, yttrium and cerium dioxide. He called yttrium a "hazardous material you are injecting into a Coastal Zone environment" and asked the company to disclose the contents of its fuel cells. If Bloom were manufacturing the fuel cells in the Coastal Zone, the program probably would require the company to disclose their contents and provide details of "the raw materials, intermediate products, byproducts and final products and their characteristics from material safety data sheets (MSDS's)," according to Coastal Zone Act Regulation 8.2.10. In 2011, the Coastal Zone program refused to waive confidentiality for another applicant and required disclosure of raw materials.

However, the fuel cells are being manufactured elsewhere, and this Coastal Zone permit application deals with the generation of electricity. The fuel cells are encased in the Bloom energy servers.

Upon review, the Division of Air Quality agreed that the contents of the fuel cells are not hazardous; in the event of a mishap regarding these cells – a natural disaster, explosion or human error – the contents of these units will not pose a hazard.

Note: *The most prevalent use of yttrium, according to several scientific websites, is in color television sets. Cerium dioxide is present in self-cleaning ovens.*

Natural Heritage report. Bloom submitted the report from DNREC's Natural Heritage and Endangered Species program as an early addendum (November 17, 2011) to its Coastal Zone application. The Coastal Zone program inadvertently omitted the report from the exhibits. Bloom did not respond to the report, which did not express any serious concerns about the project.

Farmland value. Based on data obtained from the Delaware Department of Agriculture, twenty-two parcels (3,922.4 acres) in New Castle County's portion of the Coastal Zone have had their development rights purchased for $7,013,545.72, or $1,788.08/acre. The land, while currently being used for agriculture, is not zoned for industry but is zoned residential Suburban (S) under the New Castle County Unified Development Code. Bloom offered $2,118 an acre.

Sea Level Rise. A review of DNREC's Sea Level Rise Inundation Maps (http://www.dnrec.delaware.gov/Pages/SLRMaps.aspx) indicate that the project site, located at 1593 River Road, New Castle, would not be adversely affected by the 0.5, 1.0, and 1.5 meter sea level rise scenarios (as described at http://www.dnrec.delaware.gov/coastal/Documents/SeaLevelRise/Final%20and%20Signed%20DNREC%20SLR%20scenarios.pdf).

Natural gas. The representative from the Delaware Riverkeeper Network expressed concern about using natural gas, which will be piped to the Bloom facility via Delmarva Power's distribution line. She referred to natural gas an "extreme fossil fuel," tying it to the Marcellus shale "fracking" controversy. The Delaware General Assembly determined in 2011 that fuel cells powered by natural gas are considered a renewable source of electrical generation for purposes of meeting the state's Renewable Portfolio Standards.

Offset to Coastal Zone. Bloom's offset proposal was generally addressed in the introduction. The Coastal Zone Act regulations indicate a hierarchy of preference for offsets, although many variations to that hierarchy have been accepted since the regulations were adopted in 1999:

> 9.1.3 The Secretary shall give preference to offset projects that are within the Coastal Zone,that occur in the same environmental medium as the source of degradation of the environment, that occur at the same site as the proposed activity requiring a permit and that occur simultaneously with the implementation of the proposed activity needing an offset.

Bloom used National Oceanic and Atmospheric Administration (NOAA) meteorological studies to demonstrate that air pollutants wind up in Delaware's Coastal Zone from points west – Pennsylvania, Ohio, Kentucky and West Virginia. Bloom's assertion is that it is offsetting dirtier generation in places that have been sending us their particulates, NOx and other emissions. Granted, one can question whether 47MW of Bloom generation here automatically results in 47 fewer megawatts of coal generation in Ohio or somewhere else. Such a theory is almost impossible to prove or disprove beyond a doubt. However, the bottom line is Bloom's own emissions are considered minimal.