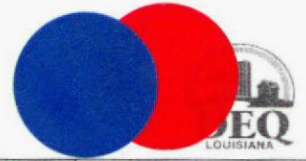




# AIR PERMIT ROUTING/APPROVAL SLIP-Permits

1-3-17



AI No.	3133	Company	TopChem Pollock, LLC	Date Received	3/30/2016
Activity No.	PER20160003	Facility		Permit Type	
CDS No.	1120-00003	Permit No.	PSD-LA-815	Expedited Permit	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

1. Technical Review	Approved	Date rec'd	Date FW	Comments
Permit Writer	<i>[Signature]</i>		01/15/16	
Air Quality / Modeling	<i>[Signature]</i>		7/20/16 OK	
Toxics				
Technical Advisor	<i>[Signature]</i>		7/22/16	
Supervisor				
Other				
2. Management Review (if PN req'd)	Approved	Date rec'd	Date FW	Comments
Supervisor				
Manager	<i>[Signature]</i>		8/26/16	7/30/16
Assistant Secretary (PN)	<i>[Signature]</i>		9/14/16	DT 9/16/16
3. Response to Comments (if PN req'd)	Approved	Date rec'd	Date FW	Comments
Supervisor				
Manager				
Administrator				
Legal (BFD)				
4. Final Approval	Approved	Date rec'd	Date FW	Comments
Supervisor				
Manager	<i>[Signature]</i>		12/20/16	
Administrator	<i>[Signature]</i>		12/20/16	
Assistant Secretary	<i>[Signature]</i>		12/20/16	

1. Technical Review					
PN of App needed	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	Date of PN of App		Newspaper	
Fee paid	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no				
NSPS applies	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	PSD/NNSR applies	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	NESHAP applies	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no

2. Post-Technical Review					
Company technical review	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a	E-mail date	07/22/16	Remarks received	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no 07/29/16
Surveillance technical review	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> n/a	E-mail date	07/29/16	Remarks received	<input type="checkbox"/> yes <input type="checkbox"/> no

3. Public Notice					
Public Notice Required	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no				
Library					
PN newspaper 1/City	The Advocate/Baton Rouge	PN Date	09/22/16	EDMS Verification	<input type="checkbox"/> yes <input type="checkbox"/> no
PN newspaper 2/City	The Chronicle	PN Date	09/22/16	Verification	<input type="checkbox"/> yes <input type="checkbox"/> no
Company notification letter sent	Date mailed				
EPA PN notification e-mail sent	Date e-mailed	10/03/16			
OES PN mailout	Date				

4. Final Review					
Public comments received	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	EPA comments rec'd	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no	Date EPA Resp. to Comments-mailed	
Company comments received	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no	PN info entered into Permit Sec VI	<input type="checkbox"/> yes <input type="checkbox"/> no	Date EPA approved permit	
Comments					

JOHN BEL EDWARDS  
GOVERNOR



CHUCK CARR BROWN, Ph.D.  
SECRETARY

**State of Louisiana**  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL SERVICES

Certified Mail No. 7004 2510 0006 3856 9727

Agency Interest (AI) No. 3133  
Activity No. PER20160003

Mr. Raimondas Petreikis  
TopChem Pollock, LLC  
3867 Plaza Tower Dr.  
Baton Rouge, LA 70816

RE: Prevention of Significant Deterioration (PSD) Permit, PSD-LA-815  
TopChem Pollock, LLC Facility  
TopChem Pollock, LLC,  
Pollock, Grant Parish, Louisiana

Dear Mr. Petreikis:

Enclosed is your permit, PSD-LA-815. Construction of the proposed project is not allowed until such time as the corresponding Part 70 Operating Permit is issued.

Please be advised that pursuant to provisions of the Environmental Quality Act and the Administrative Procedure Act, the Department may initiate review of a permit during its term. However, before it takes any action to modify, suspend or revoke a permit, the Department shall, in accordance with applicable statutes and regulations, notify the permittee by mail of the facts or operational conduct that warrant the intended action and provide the permittee with the opportunity to demonstrate compliance with all lawful requirements for the retention of the effective permit.

Should you have any questions, contact Mei Wu of the Air Permits Division at (225) 219-3428.

Sincerely,

A handwritten signature in black ink, appearing to read "E. Vega", written over a horizontal line.

Elliott B. Vega  
Assistant Secretary

12/20/16  
Date

EBV: MDW

c: US EPA Region VI

**Agency Interest No. 3133**

**PSD-LA-815**

**AUTHORIZATION TO CONSTRUCT AND OPERATE A MODIFIED MAJOR SOURCE  
PURSUANT TO THE PREVENTION OF SIGNIFICANT DETERIORATION  
REGULATIONS IN LOUISIANA ENVIRONMENTAL REGULATORY CODE,  
LAC 33:III.509**

In accordance with the provisions of the Louisiana Environmental Regulatory Code, LAC 33:III.509,

TopChem Pollock, LLC,  
737 Abe Hall Rd  
Pollock, Grant Parish, Louisiana

is authorized to construct the ammonia production plant at

737 Abe Hall Rd  
Pollock, Louisiana 71467

subject to the emissions limitations, monitoring requirements, and other conditions set forth hereinafter.

This permit and authorization to construct shall expire at midnight on June 20, 2018, unless physical on site construction has begun by such date, or binding agreements or contractual obligations to undertake a program of construction of the source are entered into by such date.

Signed this 20<sup>th</sup> day of December, 2016.



Elliott B. Vega  
Assistant Secretary  
Office of Environmental Services  
Louisiana Department of Environmental Quality

## **BRIEFING SHEET**

**TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
TopChem Pollock, LLC  
Pollock, Grant Parish, Louisiana  
PSD-LA-815**

### **PURPOSE**

TopChem Pollock, LLC proposes to construct and operate an ammonia production plant at former Vanguard Biodiesel Production Plant location – 737 Abe Hall Road in Pollock, Louisiana.

The Biodiesel production facility is no longer operational; all sources from the biodiesel production facility have been removed from the site.

### **RECOMMENDATION**

Approval of the proposed construction and issuance of a permit.

### **REVIEWING AGENCY**

Louisiana Department of Environmental Quality, Office of Environmental Services, Air Permits Division

### **PROJECT DESCRIPTION**

The proposed ammonia production plant will be capable of producing 1500 metric tons per day of liquid ammonia at -33 °C. The ammonia process has been grouped into three process steps:

- Raw Synthesis Gas Preparation
- Synthesis Gas Purification
- Compression and Ammonia Synthesis

#### **Raw Synthesis Gas Preparation**

Raw synthesis gas is produced from natural gas in four steps, the first of which is desulfurizing the natural gas feed. The natural gas feed is mixed with hydrogen and heated in an exchanger from recycled loop purge gas. The natural gas/hydrogen mixture is passed over a catalyst bed where organic sulfur compounds react with hydrogen to convert the complex sulfur compounds in the gas to hydrogen sulfide which is subsequently removed by adsorption. The natural gas existing the desulfurizers is expected to contain less than 0.26 ppm sulfur. All natural gas, whether used as feedstock or as fuel, is desulfurized.

## BRIEFING SHEET

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**

The next step is partial reforming of the hydrocarbons contained in the desulfurized feed to an intermediate level in the Primary Reformer Furnace (EPN RS-16-1, EQT029). This is followed by further reforming where the methane is reduced to a low level by introducing sufficient air to give the stoichiometric amount of nitrogen when required for ammonia synthesis. In the shift conversion step, CO is converted to CO<sub>2</sub> by reaction with steam, producing simultaneously an equivalent amount of hydrogen.

The reformer uses natural gas as fuel to all burners. The flue gas will go through the Selective Catalytic Reduction (SCR) catalyst. Ammonia is injected upstream of the SCR catalyst to convert NO<sub>x</sub> to nitrogen and water. Flue gas heat is used to generate steam and heat other streams in the process.

### Synthesis Gas Purification

The removal of carbon dioxide from the synthesis gas is accomplished by use of BASF's activated methyldiethanolamine (aMDEA<sup>®</sup>) technology. The synthesis gas passes through a reactor that contains the alkaline aMDEA<sup>®</sup> scrubbing solution. This results in an acid-base reaction. The scrubbing solution is then heated in another reactor to release the CO<sub>2</sub>. Thus purified aMDEA<sup>®</sup> solution is recycled to the first reactor and used again. The stripper overhead vapor is vented to the atmosphere (EPN CO2SC-16-1, EQT031) as steam and CO<sub>2</sub>.

### Purified Synthesis Gas Compression and Ammonia Synthesis

The purified synthesis gas is sent to an electric turbine driven two-case centrifugal compressor. The synthesis gas make-up stream which leaves the second case is cooled against cooling water and ammonia refrigerant and then mixed with recycle gas.

Recycle gas, containing 13.2% ammonia, is water cooled and then chilled by ammonia refrigerant and heat exchange against secondary flash gas. Mixing with the fresh synthesis stream results in some of the condensed ammonia in the recycle stream being vaporized until equilibrium is reached. The mixture, containing about 10.6% ammonia is further chilled before entering the ammonia separator where condensed ammonia is disengaged from the converter feed.

The gas from the separator, with its ammonia content reduced to about 1.7%, is preheated by the recycle gas and fresh feed gas and then compressed up to synthesis pressure in the synthesis gas compressor. Before entering the ammonia converter, the synthesis gas is preheated by heat exchange with converter effluent. The synthesis converter consists of a high pressure shell containing a catalyst section and a heat exchanger or interchanger. The ammonia converter Start-Up Heater (EPN SUH-16-

## BRIEFING SHEET

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**

1, EQT030) heats up the catalyst to a temperature where the reaction is self-sustaining. The total ammonia from the ammonia separator and from the high pressure purge gas separator is flashed into a let-down drum where most of the inerts dissolved in the high pressure liquid are released. The flash vapor is mixed with other flash and purge gases to be used as fuel.

The ammonia product is sent to the ammonia storage tank and then loaded out by pipeline, railcars, or trucks. The Loading Operations (EPN LD-16-1, EQT033) are conducted via closed loop with vapors routed back to the tank. Some railcars will be opened for maintenance purposes with the vapors routed to the Process Flare (EPN FL-16-1, EQT034) at 98% control efficiency. A small amount of ammonia is released to the air from disconnecting pipes from the railcars and trucks.

One Cooling Tower (EPN CT-16-1, EQT032) is used to provide cooling water throughout the process.

A 460 hp Diesel Fired Emergency Generator Engine (EPN DEG-16-1, EQT035) is used to generate electricity to operate critical system when power is not available. Additionally, two 225 hp diesel fired pump engines (EPN DFP-16-1 and DFP-16-1, EQT036 and EQT037) service the fire protection needs of the facility

Estimated emissions in tons per year are as follows:

<u>Pollutant</u>	<u>Before</u>	<u>After</u>	<u>Change</u>
PM <sub>10</sub>	3.72	12.36	+ 8.64
PM <sub>2.5</sub>	-	12.35	+ 12.36
SO <sub>2</sub>	2.71	1.09	- 1.62
NO <sub>x</sub>	21.38	34.96	+ 13.58
CO	9.53	178.40	+ 168.87
VOC	16.44	9.03	-7.41
CO <sub>2e</sub>	-	550,839	+ 550,839

## BRIEFING SHEET

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**

Estimated emissions, in tons per year, are as follows:

<u>Pollutant</u>	<u>Emissions</u>	<u>PSD de minimis</u>	<u>Review required?</u>
PM	12.36	25	No
PM <sub>10</sub>	12.36	15	No
PM <sub>2.5</sub>	12.35	10	Yes
SO <sub>2</sub>	1.09	40	No
NO <sub>x</sub>	34.96	40	No
CO	178.40	100	Yes
VOC	9.03	40	No
CO <sub>2e</sub>	550,839	75,000	Yes

### TYPE OF REVIEW

Based on the data presented in the table above, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and VOC emissions are less than their respective significance levels and no PSD review is required.

Particulate matter (PM<sub>2.5</sub>), carbon monoxide (CO), and greenhouse gases (GHG or CO<sub>2e</sub>) emissions from the proposed facility will be above PSD significance levels. Therefore, the requested permit was reviewed in accordance with PSD regulations for PM<sub>2.5</sub>, CO, and CO<sub>2e</sub> emissions. Emissions of LAC 33:III.Chapter 51-regulated toxic air pollutants (TAP) have been reviewed pursuant to the requirements of the Louisiana Air Quality Regulations.

### BEST AVAILABLE CONTROL TECHNOLOGY

PM<sub>2.5</sub>, CO, and CO<sub>2e</sub> emissions are above PSD significance levels and must undergo PSD analyses. The selection of control technology was based on the BACT analysis using a "top down" approach and did not include consideration of control of toxic materials.

## BRIEFING SHEET

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**

Summary of BACT:

Emission ID	Pollutant	BACT/LAER	Emission factors/limits	Control Technology
Primary Reformer Stack RS-16-1 (EQT029)	PM <sub>2.5</sub>	BACT	0.00745 lb/MM BTU of natural gas	Good Combustion Practices
	CO	BACT	0.0824 lb/MM BTU of natural gas	Good Combustion Practices
	CO <sub>2e</sub>	BACT	111.72 kg/MM BTU of CO <sub>2</sub> , 0.001 kg/MM BTU of CH <sub>4</sub> , and 0.0001 kg/MM BTU of N <sub>2</sub> O	Energy efficiency measure
Ammonia Converter Start-up Heater Stack SUH-16-1 (EQT030)	PM <sub>2.5</sub>	BACT	7.6 lb/MM scf of natural gas	Use of pipeline quality natural gas and good combustion practices
	CO	BACT	84 lb/MM scf of natural gas	
	CO <sub>2e</sub>	BACT	52.21 kg/MM BTU of CO <sub>2</sub> , 0.001 kg/MM BTU of CH <sub>4</sub> , and 0.0001 kg/MM BTU of N <sub>2</sub> O	
CO <sub>2</sub> Stripper Column CO2SC-16-1 (EQT031)	CO <sub>2e</sub>	BACT	0.29 Ton CO <sub>2e</sub> /Metric Ton of NH <sub>3</sub> produced	
Cooling Tower CT-16-1(EQT032)	PM <sub>2.5</sub>	BACT	0.001% drift	High Efficiency Drift Eliminator
Process Flare FL-16-1 (EQT034)	PM <sub>2.5</sub>	BACT	Correct Flare Design and Proper Combustion	Compliance with the Louisiana Non-NSPS Flare Requirements
	CO	BACT		
	CO <sub>2e</sub>	BACT		
Generator Engine DEG-16-1 (EQT035)	PM <sub>2.5</sub>	BACT	0.2 g/hp-hr	Meet NSPS Subpart IIII Limitations and Good Combustion Practices
		BACT	4.0 g/hp-hr	
	CO	BACT	3.5 g/hp-hr	
	CO <sub>2e</sub>	BACT	73.96 kg/MM BTU of CO <sub>2</sub> , 0.003 kg/MM BTU of CH <sub>4</sub> , and 0.0006 kg/MM BTU of N <sub>2</sub> O	
Pump Engines DFP-16-1 & DFP-16-2 (EQT036 & EQT037)	PM <sub>2.5</sub>	BACT	0.15 g/hp-hr	Meet NSPS Subpart IIII Limitations and Good Combustion Practices
		BACT	3.0 g/hp-hr	
	CO	BACT	2.6 g/hp-hr	
	CO <sub>2e</sub>	BACT	73.96 kg/MM BTU of CO <sub>2</sub> , 0.003 kg/MM BTU of CH <sub>4</sub> , and 0.0006 kg/MM BTU of N <sub>2</sub> O	

## **BRIEFING SHEET**

**TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
TopChem Pollock, LLC  
Pollock, Grant Parish, Louisiana  
PSD-LA-815**

### **AIR QUALITY IMPACT ANALYSIS**

Prevention of Significant Deterioration regulations require an analysis of existing air quality for those pollutants emitted in significant amounts from a proposed facility.

American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) modeling indicates maximum ground level concentrations of PM<sub>2.5</sub> and CO are below the ambient significance levels and preconstruction monitoring exemption levels. Therefore, no preconstruction monitoring, increment analysis, or refined modeling is required for these pollutants.

### **ADDITIONAL IMPACTS**

Soils, vegetation, and visibility will not be adversely impacted by the proposed facility, nor will any Class I area be affected. The project will not result in any significant secondary growth effects. One thousand seven hundred (1700) temporary jobs and eight (80) new permanent jobs will be created.

### **PROCESSING TIME**

Application Dated:	March 15, 2016
Application Received:	March 31, 2016
Additional Information Dated:	June 9, July 1, July 13, and August 8, 2016
Effective Completeness Date:	July 30, 2016

### **PUBLIC NOTICE**

A notice requesting public comment on the permit was published in *The Advocate*, Baton Rouge, on September 22, 2016; and in *The Chronicle*, Colfax, on September 22, 2016. A copy of the public notice was mailed to concerned citizens listed in the Office of Environmental Services Public Notice Mailing List on September 22, 2016. The draft permit was also submitted to US EPA Region VI on October 3, 2016. Public hearing was held on December 06, 2016. All comments were considered prior to the final permit decision.

## PRELIMINARY DETERMINATION SUMMARY

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**  
**July 15, 2016**

### I. APPLICANT

TopChem Pollock, LLC  
737 Abe Hall Rd  
Pollock, LA 71467

### II. LOCATION

TopChem Pollock, LLC Facility will be located at 737 Abe Hall Rd in Pollock, Louisiana. Approximate UTM coordinates are 557.5 kilometers East, 3491.3 kilometers North, zone 15.

### III. PROJECT DESCRIPTION

TopChem Pollock, LLC proposes to construct and operate an ammonia production plant at former Vanguard Biodiesel Production Plant location – 737 Abe Hall Road in Pollock, Louisiana. The Vanguard Biodiesel Production Plant was operated under Permit No. 1120-00003-05 issued on June 8, 2007.

All current sources from the biodiesel production facility have been removed from the site. Under this air permit modification request, the proposed ammonia production plant will be capable of producing 1,500 metric tons per day of liquid ammonia at -33°C.

The ammonia process has been grouped into three process steps:

- Raw Synthesis Gas Preparation
- Synthesis Gas Purification
- Compression and Ammonia Synthesis

#### Raw Synthesis Gas Preparation

Raw synthesis gas is produced from natural gas in four steps, the first of which is desulfurizing the natural gas feed. The natural gas feed is mixed with hydrogen and heated in an exchanger from recycled loop purge gas. The natural gas/hydrogen mixture is passed over a catalyst bed where organic sulfur compounds react with hydrogen to convert the complex sulfur compounds in the gas to hydrogen sulfide which is subsequently removed by adsorption. The natural gas

## PRELIMINARY DETERMINATION SUMMARY

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**  
**July 15, 2016**

existing the desulfurizers is expected to contain less than 0.26 ppm sulfur. All natural gas, whether used as feedstock or as fuel, is desulfurized.

The next step is partial reforming of the hydrocarbons contained in the desulfurized feed to an intermediate level in the Primary Reformer Furnace (EPN RS-16-1, EQT029). This is followed by further reforming where the methane is reduced to a low level by introducing sufficient air to give the stoichiometric amount of nitrogen when required for ammonia synthesis. In the shift conversion step, CO is converted to CO<sub>2</sub> by reaction with steam, producing simultaneously an equivalent amount of hydrogen.

The reformer uses natural gas as fuel to all burners. The flue gas will go through the Selective Catalytic Reduction (SCR) catalyst. Ammonia is injected upstream of the SCR catalyst to convert NO<sub>x</sub> to nitrogen and water. Flue gas heat is used to generate steam and heat other streams in the process.

### Synthesis Gas Purification

The removal of carbon dioxide from the synthesis gas is accomplished by use of BASF's activated methyldiethanolamine (aMDEA<sup>®</sup>) technology. The synthesis gas passes through a reactor that contains the alkaline aMDEA<sup>®</sup> scrubbing solution. This results in an acid-base reaction. The scrubbing solution is then heated in another reactor to release the CO<sub>2</sub>. Thus purified aMDEA<sup>®</sup> solution is recycled to the first reactor and used again. The stripper overhead vapor is vented to the atmosphere (EPN CO2SC-16-1, EQT031) as steam and CO<sub>2</sub>.

### Purified Synthesis Gas Compression and Ammonia Synthesis

The purified synthesis gas is sent to an electric turbine driven two-case centrifugal compressor. The synthesis gas make-up stream which leaves the second case is cooled against cooling water and ammonia refrigerant and then mixed with recycle gas.

Recycle gas, containing 13.2% ammonia, is water cooled and then chilled by ammonia refrigerant and heat exchange against secondary flash gas. Mixing with the fresh synthesis stream results in some of the condensed ammonia in the recycle stream being vaporized until equilibrium is reached. The mixture, containing about 10.6% ammonia is further chilled before entering the ammonia separator where condensed ammonia is disengaged from the converter feed.

The gas from the separator, with its ammonia content reduced to about 1.7%, is preheated by the recycle gas and fresh feed gas and then compressed up to synthesis pressure in the synthesis gas

## PRELIMINARY DETERMINATION SUMMARY

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**  
**July 15, 2016**

compressor. Before entering the ammonia converter, the synthesis gas is preheated by heat exchange with converter effluent. The synthesis converter consists of a high pressure shell containing a catalyst section and a heat exchanger or interchanger. The ammonia converter Start-Up Heater (EPN SUH-16-1, EQT030) heats up the catalyst to a temperature where the reaction is self-sustaining. The total ammonia from the ammonia separator and from the high pressure purge gas separator is flashed into a let-down drum where most of the inerts dissolved in the high pressure liquid are released. The flash vapor is mixed with other flash and purge gases to be used as fuel.

The ammonia product is sent to the ammonia storage tank and then loaded out by pipeline, railcars, or trucks. The Loading Operations (EPN LD-16-1, EQT033) are conducted via closed loop with vapors routed back to the tank. Some railcars will be opened for maintenance purposes with the vapors routed to the Process Flare (EPN FL-16-1, EQT034) at 98% control efficiency. A small amount of ammonia is released to the air from disconnecting pipes from the railcars and trucks.

One Cooling Tower (EPN CT-16-1, EQT032) is used to provide cooling water throughout the process.

A 460 hp Diesel Fired Emergency Generator Engine (EPN DEG-16-1, EQT035) is used to generate electricity to operate critical system when power is not available. Additionally, two 225 hp diesel fired pump engines (EPN DFP-16-1 and DFP-16-1, EQT036 and EQT037) service the fire protection needs of the facility

Estimated emissions in tons per year are as follows:

<u>Pollutant</u>	<u>Before</u>	<u>After</u>	<u>Change</u>
PM <sub>10</sub>	3.72	12.36	+ 8.64
PM <sub>2.5</sub>	-	12.35	+ 12.36
SO <sub>2</sub>	2.71	1.09	- 1.62
NO <sub>x</sub>	21.38	34.96	+ 13.58
CO	9.53	178.40	+ 168.87
VOC	16.44	9.03	-7.41
CO <sub>2e</sub>	-	550,839	+ 550,839

## PRELIMINARY DETERMINATION SUMMARY

TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
TopChem Pollock, LLC  
Pollock, Grant Parish, Louisiana  
PSD-LA-815  
July 15, 2016

The proposed project will result in PM<sub>2.5</sub>, CO, and CO<sub>2e</sub> emissions over PSD thresholds, therefore, PSD review is required.

<u>Pollutant</u>	<u>Emissions</u>	<u>PSD de minimis</u>	<u>Review required?</u>
PM	12.36	25	No
PM <sub>10</sub>	12.36	15	No
PM <sub>2.5</sub>	12.35	10	Yes
SO <sub>2</sub>	1.09	40	No
NO <sub>x</sub>	34.96	40	No
CO	178.40	100	Yes
VOC	9.03	40	No
CO <sub>2e</sub>	550,839	75,000	Yes

#### IV. SOURCE IMPACT ANALYSIS

A proposed net increase in the emission rate of a regulated pollutant above de minimis levels for new major or modified major stationary sources requires review under Prevention of Significant Deterioration regulations, 40 CFR 52.21. PSD review entails the following analyses:

- A. A determination of the Best Available Control Technology (BACT);
- B. An analysis of the existing air quality and a determination of whether or not preconstruction or postconstruction monitoring will be required;
- C. An analysis of the source's impact on total air quality to ensure compliance with the National Ambient Air Quality Standards (NAAQS);
- D. An analysis of the PSD increment consumption;
- E. An analysis of the source related growth impacts;
- F. An analysis of source related growth impacts on soils, vegetation, and visibility;
- G. A Class I Area impact analysis; and
- H. An analysis of the impact of toxic compound emissions.

## PRELIMINARY DETERMINATION SUMMARY

**TopChem Pollock, LLC Facility**  
**Agency Interest No.: 3133**  
**TopChem Pollock, LLC**  
**Pollock, Grant Parish, Louisiana**  
**PSD-LA-815**  
**July 15, 2016**

### **A. BEST AVAILABLE CONTROL TECHNOLOGY**

Under current PSD regulations, an analysis of “top down” BACT is required for the control of each regulated pollutant emitted from a modified major stationary source in excess of the specified significant emission rates. The top down approach to the BACT process involves determining the most stringent control technique available for a similar or identical source. If it can be shown that this level of control is infeasible based on technical, environmental, energy, and/or cost considerations, then it is rejected and the next most stringent level of control is determined and similarly evaluated. This process continues until a control level is arrived at which cannot be eliminated for any technical, environmental, or cost reason. A technically feasible control strategy is one that has been demonstrated to function efficiently on identical or similar processes. Additionally, BACT shall not result in emissions of any pollutant which would exceed any applicable standard under 40 CFR Parts 60 and 61.

A BACT analysis is required for a major stationary source or major modification subject to PSD analysis. A new major stationary source shall apply BACT for each regulated NSR pollutant that it would have the potential to emit in significant amounts. For this project, BACT analysis is required for PM<sub>2.5</sub>, CO, and CO<sub>2e</sub> as these project-related pollutants exceed the PSD significance thresholds.

BACT is performed in a five-step process referred to as the “top down” approach. This process involves determining the most stringent control technique available for a similar or identical source. The five steps included in the “top down” process are as follows:

**Step 1** Identify all available control technologies.

**Step 2** Eliminate technically infeasible options.

**Step 3** Rank the remaining control technologies.

**Step 4** Evaluate the most effective controls and document the results.

**Step 5** Select BACT.

If it can be shown that this level of control is infeasible based on technical, environmental, energy, and/or cost considerations, then it is rejected and the next most stringent level of

## PRELIMINARY DETERMINATION SUMMARY

**TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
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control is determined and similarly evaluated. This process continues until a control level is arrived at which cannot be eliminated based on the above considerations. Selection of a BACT that is less stringent than an applicable NSPS or NESHAP or any other state or federal air program is not allowed.

For this project, BACT analyses are required for PM<sub>2.5</sub>, CO, and CO<sub>2e</sub> emissions from the Vanguard Ammonia Production Plan.

### 1) BACT analysis for Primary Reformer Stack (RS-161 – 1; EQT 029)

#### • PM<sub>2.5</sub> BACT Analysis for Natural Gas Fired Reformer Stack (EQT029)

PM emissions from combustion of natural gas primarily result from carryover of noncombustible trace constituents in the fuel. PM emissions can be classified as "filterable" or "condensable" PM. Filterable PM is that portion of the total PM that exists in the stack in either the solid or liquid state. Condensable PM exists as a gas in the stack but condenses in the cooler ambient air to form PM. Condensable PM is composed of organic and inorganic compounds and is generally considered to all being less than 1.0 micrometers in aerodynamic diameter. In natural gas fired heaters, all PM is considered to be less than 2.5 micrometers; therefore, all PM and PM<sub>10</sub> is considered equivalent to PM<sub>2.5</sub>.

#### Identify and Evaluate Available Reformer PM Control Technologies

Potential control technologies for controlling PM emissions from the natural gas fired reformer are listed below:

- Fabric Filter
- Electrostatic Precipitator
- Wet Scrubbing
- Good Combustion Practices

Particulate from natural gas fired burners are negligible because of the low ash content and, therefore, can be controlled to low levels by the use of low ash, low sulfur fuels, which

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include pipeline-quality natural gas and good combustion practices. Good combustion practices encompassing proper design and performing recommended maintenance and operation promote efficient combustion and reduced particulate formation. Post-combustion PM/PM<sub>10</sub>/PM<sub>2.5</sub> controls include fabric filters, electrostatic precipitators (ESP), and wet scrubbing.

**Fabric filter baghouses** are efficient at removing smaller particle sizes. As particulate is collected, a cake is formed on the filter media and larger particles drop out while smaller particles collect on the dust layer. Once the flow through the system is restricted to a pre-determined pressure drop, the bag is cleaned and the filtering process begins another cycle. While baghouses can remove large and small particles efficiently, only 1.9 lb/MMscf are filterable while 5.7 lb/MMscf (per AP-42 Table 1.4-2) are condensable. Due to a filter baghouse only being able to filter 25% of the flue gas particulate, they are considered technically infeasible for natural gas combustion particulate removal.

**Electrostatic Precipitators (ESPs)** are often seen as controls for fossil fuel fired power plants such as coal fired facilities as well as dryer vents which dry products resulting in large particle sizes in the flue gas. ESPs charge particles as they pass electrodes. The charged particles are captured on oppositely charged collecting plates. ESPs decrease in efficiency as particle size diminishes. Since the reformer burns natural gas, the particle size is nearly entirely below 1 micron in size. ESPs are not considered technically feasible for this natural gas fired industrial heater (reformer). This is due to the small particle size in a large flue gas volume and extremely low noncombustible trace constituents of ash and sulfur in the natural gas fuel and flue gas from the burners.

**Wet scrubbers** are utilized in many vent processes to filter the vent stream of pollutants and particulates. A wet scrubber operates by spraying a wet media (scrubbing solution) from the top of a vent while the gas being filtered enters the wet media from below. As the two pass, the scrubbing solution contacts the pollutant being filtered and entrains it in the wet media. The scrubbing solution is then typically cleaned and recycled through the system. Because of the extremely small particulate size in the natural gas combustion flue gas along with the flue volume, the likeliness of contact of the limited filterable particulate with the scrubbing solution is minimal and efficiency is decreased. Therefore, wet scrubbing is not considered a control technology for removing particulate from natural gas combustion and is considered technically infeasible for the reformer.

**Good combustion practices** involve proper burner and firebox design to maximize complete combustion of the fuel through proper air-to-fuel ratio, residence time, temperature, and combustion zone turbulence. Complete combustion of natural gas will result in minimal

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particulate emissions formed as soot. Operating procedures provided by the vendor should be followed to achieve the greatest efficiency and performance and therefore the least amount of particulate.

The reformer burners at TopChem will fire only desulfurized pipeline-quality natural gas.

### **Rank and Select PM<sub>2.5</sub> BACT for the Reformer**

The RACT/BACT/LAER Clearinghouse (RBLC) database search supports the use of good combustion practices and clean burning fuels as BACT for natural gas combustion for PM/PM<sub>10</sub>/PM<sub>2.5</sub>. Therefore, the use of pipeline quality natural gas and good combustion practices is selected as BACT for PM<sub>2.5</sub> since it is the remaining technically feasible control technology.

### **• CO BACT Analysis for the Natural Gas Fired Reformer stack (EQT029)**

Emission of CO from natural gas fired reformers depends on the efficiency of combustion. Improperly tuned burners and operating the reformer outside of design parameters decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of NO<sub>x</sub> control systems such as low NO<sub>x</sub> burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers. The RBLC demonstrates that most permitting agencies required good combustion practices or CO oxidation catalyst as the approved BACT option for large natural gas fired units. When reviewing the RBLC BACT determinations, fuel combustion sources greater than 250 MM BTU/hr were included and other source types were eliminated from the evaluation.

### **Identify and Evaluate Available Reformer CO Control Technologies**

Available control technologies for controlling CO emissions from the natural gas fired reformer are:

- Catalyst Oxidation
- Good Combustion Practices

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**Oxidation Catalyst** for CO promotes conversion of CO to CO<sub>2</sub> through oxidation. Catalyst can vary in makeup but typically are constructed of ceramic honeycomb coated with aluminum oxide or platinum group metals such as platinum, palladium, and rhodium. When the CO contacts the catalyst, it is oxidized to CO<sub>2</sub> in the presence of oxygen. If enough oxygen is not present in the exhaust, secondary air is introduced in front of the catalyst to promote the reaction.

**Good Combustion Practices** ensure sufficient mixing of air and fuel along with proper flame temperature to ensure efficient combustion. A properly designed, adjusted, and maintained gas flame and correctly sized flue produces only small amounts of carbon monoxide.

### Rank and Select the Most Effective Reformer CO Controls

Table below ranks the technically feasible control technologies for the proposed natural gas fired reformers. While catalytic oxidation was considered as BACT, it would cost approximately \$63,441.41 to remove one ton of CO emissions. There are also associated environmental and energy impacts with this technology. The catalyst creates a new waste stream that requires periodic treatment and disposal. Therefore, catalytic oxidation was rejected as a BACT option. The RBLC demonstrates that modern burner design and combustion of pipeline quality natural gas which is an inherently low in CO emissions are typically approved as BACT for natural gas fired reformers. TopChem selects good combustion practices as BACT and proposes a limit of 0.0824 lb/MM BTU.

Rank	Control Technology	Selected as BACT	Negative Impacts	Emission Rate	Cost Effectiveness (\$/ton)
1	Catalytic Oxidation	No	Waste Stream from Catalyst	0.0013 lb/MM BTU	\$63,441.41
2	Good Combustion Practices	Yes	NA	0.0824 lb/MM BTU	NA

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- **GHG BACT Analysis for the Natural Gas Fired Reformer Stack (EQT029)**

Greenhouse Gas BACT analysis must be performed for each new or modified emissions unit which contributes to an increase in GHGs which are subject to PSD review. The natural gas reformer at TopChem is a new unit and has emissions of GHGs. The emitted GHGs from the burner are composed of CO<sub>2</sub>, methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Emissions of GHGs are calculated using emission factors provided by the EPA. Evaluation of BACT for GHGs will be performed for the natural gas fired reformer in conjunction as emission factors and energy efficiency measures from EPA guidance are addressed by fuel type.

### **Identify Available GHG Reformer Control Technologies and Eliminate Technically Infeasible Options**

The identified control technologies for GHGs are as followings.

- Carbon Capture and Storage (CCS)
- Energy Efficiency Measures

CCS is typically comprised of three steps. They are a means to capture CO<sub>2</sub>, a means to transport the CO<sub>2</sub> and a place for storage. In order to capture the CO<sub>2</sub> gas from the exhaust of the combustion unit, it must first be separated from other gases. Separation may be accomplished by using a sorbent or solvent, a membrane, or by cryogenic distillation. Once the CO<sub>2</sub> is separated from the flue gases it must be transported for storage or sequestering. Storage or sequestration options include Enhanced Oil Recovery (EOR), ocean injection, algae capture, and suitable geological formations.

Separation of the CO<sub>2</sub> gas from the flue gas has been demonstrated in industrial applications by using an amine-based gas adsorption process. These processes typically consist of five primary equipment systems:

- Flue Gas Cooling
- CO<sub>2</sub> Absorption
- Solvent Regeneration

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- Solvent Reclaiming
- Solvent / Chemical Storage and Handling

In many plant designs, a CO<sub>2</sub> compression system is also included on the back end of the process.

After capturing the separated CO<sub>2</sub>, transportation to a suitable sequestration or storage facility must occur. Transportation of CO<sub>2</sub> can occur by ship, truck, rail, or pipeline to a geological formation, CO<sub>2</sub> pipeline, or other sequestration site. The Denbury Green Pipeline (CO<sub>2</sub> pipeline) extends across southern Louisiana from Donaldsonville westward towards Lake Charles and ends in Hastings Field south of Houston, Texas. Since the CO<sub>2</sub> pipeline is greater than 75 miles from Pollock, the only operation for transport is rail or ship. Due to the location of the facility, ship transport is not an option.

Storage opportunities consist of suitable geological formations such as oil and gas reservoirs, coal bed methane and saline formations. Production from an oil or natural gas reservoir can be enhanced by pumping CO<sub>2</sub> into the reservoir to push out the product, which is called enhanced oil recovery. Coal beds typically contain large amounts of methane-rich gas that is adsorbed onto the surface of the coal. The current practice for recovering coal bed methane is to depressurize the bed, usually by pumping water out of the reservoir. An alternative approach is to inject CO<sub>2</sub> into the bed. Tests have shown that the adsorption rate for CO<sub>2</sub> to be approximately twice that of methane, giving it the potential to efficiently displace methane and remain stored in the bed. Last, CO<sub>2</sub> can be injected into saline formation. It has been estimated that deep saline formations in the United States could potentially store more than 12,000 billion tons of CO<sub>2</sub>.

**Energy Efficiency Measures**, like good combustion practices, may be used to reduce GHG pollutants (CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O). EPA GHG BACT guidance provides measures to reduce GHGs and also references ENERGY STAR, which has developed sector-specific Energy Guides for a number of industries. The February 2005 ENERGY STAR Guide for Energy and Plant Managers provided by Berkeley Lab and the EPA GHG BACT Guidance suggests the following work practice and design standards to reduce the potential for GHG emissions from boilers and heaters.

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Regular maintenance of burners, draft control and heat exchangers is essential to maintain safe and energy efficient operation of a process heater. Badly maintained process heaters may use excess air. This reduces the efficiency of the burners. Excess air should be limited to 2 to 3 percent oxygen to ensure complete combustion. The use of oxygen monitors and intake flow monitors can be used to optimize the air-to-fuel mixture and limit excess air. Also, a simple maintenance program to ensure all components of the burner are operating at peak performance will assist in efficiency. ENERGY STAR also suggests that due to new air quality regulations, demand to reduce NO<sub>x</sub> and VOC emissions from furnaces and boilers will require new burner design. Use of newer burner designs with better combustion efficiency will result in cost savings.

The ENERGY STAR guidance provides that use of Flue gas heat recovery is another way to increase efficiency. Flue gas heat recovery is utilized throughout the process.

### **Rank and Select the Most Effective Control Technologies for Reformer for GHGs**

<b>Rank</b>	<b>Control Technology</b>	<b>Control Efficiency</b>
<b>1</b>	<b>Carbon Capture and Storage</b>	<b>90%</b>
<b>2</b>	<b>Energy Efficiency Measures</b>	<b>Baseline</b>

**CCS:** There are no suitable geological formations in the immediate area which provide storage or sequestration opportunities. The only option would be to liquefy the CO<sub>2</sub>, load it onto rail and transfer to an existing pipeline on the Gulf of Mexico.

In order to capture the CO<sub>2</sub> from the reformers and heaters, additional means to capture, compress, and transport would have to be installed as BACT control. The additional equipment required to capture CO<sub>2</sub> from the reformers and heaters would increase annual capital cost by \$17 million. In terms of cost per ton of CO<sub>2</sub>, capture and compression of the CO<sub>2</sub> would cost \$67.45/ton. With the facility producing 549,861 tons/year, to clean and recover the CO<sub>2</sub> would cost approximately \$37 million/year. This cost does not include the

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cost of transporting the CO<sub>2</sub> to an end user as no end user has been identified. The increase in energy required to process the CO<sub>2</sub> would be costly and greatly increase emissions of combustion pollutants such as PM, NO<sub>x</sub>, CO, SO<sub>2</sub>, VOC, and hazardous air pollutants such as acetaldehyde. Such a system would have an environmental impact to the immediate area and potentially require further control of VOCs, increasing the capital and annualized cost.

Due to reasons outlined above, CCS is considered cost prohibitive.

**Energy Efficiency Measures** are far less cost prohibitive and are effective in minimizing all GHGs (CO<sub>2</sub>, methane, and N<sub>2</sub>O). Heat recovery from the produced steam as well as flue gas will occur throughout the reforming process. TopChem will also install newly designed burners in the reformer. Also, maintenance will routinely be performed to maximize efficiency. The facility will perform the following annually: 1) inspect the burner and clean or replace any components of the burner as necessary, 2) inspect the flame pattern and adjust the burner as necessary to optimize the flame pattern, 3) inspect the system controlling the air-to-fuel ratio and ensure that it is correctly calibrated and functioning properly, 4) optimize total emissions of carbon monoxide, and 5) measure the concentrations in the effluent stream of carbon monoxide in parts per million, by volume, and oxygen in volume percent, before and after the adjustments are made. These inspections along with suggested ENERGY STAR guidelines will ensure the burners are operating efficiently to reduce GHGs.

### **Select GHG BACT for the Reformer Stack**

TopChem has chosen to utilize energy efficiency measures rather than the cost-prohibitive carbon capture system as BACT for CO<sub>2</sub>e. Energy efficiency measures will be performed on the reformer. TopChem proposes 1.01 tons CO<sub>2</sub>e/metric ton of NH<sub>3</sub> (facility wide).

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Pollutant	Rank	Control Technology	Selected as BACT	Negative Impacts	Emission Rate	Cost Effectiveness (\$/ton)
GHGs	1	Energy Efficiency Measures	Yes	NA	1.01 tons CO2e/metric ton of NH3	NA
CO <sub>2</sub>	2	CCS	No	Increase in PM/PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> , CO, VOC, and HAP	-	\$67.45

### 2) BACT analysis for INTERNAL COMBUSTION ENGINES (DEG-16-1, DEP-16-1, and DEP-16-2; EQT035, EQT036, and EQT037)

Emergency engines at TopChem will be comprised of one 460-hp diesel fired reciprocating internal combustion engine (RICE) and two 225-hp diesel fired fire pump engine. The engines will use ultra-low sulfur diesel fuel (ULSD). The engines will be required to meet the latest emission requirements under 40 CFR 60 NSPS IIII, New Source Performance Standards for Compression Ignition Stationary Engines. This will require the engines to comply with the most stringent PM, CO, and NO<sub>x</sub> for the size and category of engine. The engines will be permitted to operate no more than 100 hours of non-emergency use annually (to allow for testing, maintenance, and training). Furthermore, the engines will be restricted to no more than two hours of non-emergency operation in any consecutive 24 hours.

#### PM<sub>2.5</sub> BACT Analysis for Internal Combustion Engines (EQT035, 036 & 037)

Emissions of PM from internal combustion engines are most apparent as white, blue, and black smoke. White smoke is a result of liquid particulates which appear in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of internal combustion engines (ICE). The primary constituent of black smoke is agglomerated carbon particles (soot) formed in regions of the combustion mixtures that are oxygen deficient.

Sulfates are also a contributing factor to PM emissions and are a function of only the sulfur

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content in the fuel, not combustion variables. During the combustion process, nearly all of the sulfur in the fuel is oxidized to SO<sub>2</sub>. The oxidation of SO<sub>2</sub> forms sulfur trioxide (SO<sub>3</sub>), which reacts with water to produce sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), a contributor to acid precipitation. Sulfuric acid reacts with basic substances resulting in sulfates. All particulate from ICEs is assumed to be less than one (1) micrometer in size.

Particulate traps and oxidation catalysts can be used as controls for particulate from ICEs. However, on emergency engines they are prohibitive due to their cost for the small amount of PM/PM<sub>10</sub>/PM<sub>2.5</sub> that results from the emergency engines operation. The results from the RBLC provided BACT for diesel fired engines to be good combustion and maintenance practices, ULSD, and compliance with existing Tier 2, Tier 3, and NSPS performance standards.

The emergency engines installed at TopChem will meet the required PM<sub>10</sub> emission limits found in 40 CFR 60 Subpart III. NSPS III also requires using ULSD as well as good combustion practices and maintenance activities. Therefore, PM<sub>2.5</sub> BACT is compliance with NSPS Subpart III.

### **CO BACT Analysis for Internal Combustion Engines (EQT035, 036, & 037)**

Carbon monoxide is formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to CO<sub>2</sub> cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the combustion chamber is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.

The emissions of CO from these sources totals are less than one ton per year. Due to the limited operating time of less than 100 hours per year for maintenance and testing demonstration readiness, BACT for emergency engines is compliance with applicable NESHAP and NSPS provisions. These engines will comply with requirements of 40 CFR 60 Subpart III.

### **CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O BACT Analysis for Internal Combustion Engines**

Diesel fired engines produce CO<sub>2</sub> from the combustion of the hydrocarbons present in the

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diesel fuel. Methane emissions are produced during incomplete combustion of the diesel fuel, and N<sub>2</sub>O emissions are solely a by-product of combustion.

Since the engines operate intermittently and must be utilized at a moment's notice in response to facility emergencies, add-on controls, such as CCS, are impractical. In the marketplace, there are currently no available add-on controls for methane or N<sub>2</sub>O for internal combustion engines. Fuel selection is also not an option as that would fundamentally redefine the proposed source. A search of the RBLC revealed only proper operation and good combustion practices as BACT. In complying with NSPS IIII, the engines must undergo proper maintenance and operation per the manufacturer's instructions to perform at a proper efficiency in order to meet the criteria pollutant emission rates.

Therefore, BACT is selected to be good combustion practices for both diesel fired emergency engines.

### **BACT ANALYSIS for COOLING TOWER (CT-16-1; EQT032)**

TopChem will be using a cooling tower to provide cooling for the circulating water used throughout the reforming process. The cooling tower will provide direct contact between the cooling water and the air passing through the tower. Some of the water may be entrained in the air stream and be carried out of the tower as "drift" droplets. Therefore, the PM constituent of the drift droplets may be classified as an emission.

The drift droplets generally contain the same chemical impurities as the water circulating through the tower and these impurities can be converted to emissions to the atmosphere. PM<sub>10</sub> is generated when the drift droplets evaporate and leave fine PM formed by crystallization of dissolved solids.

### **PM<sub>2.5</sub> BACT Analysis for the Cooling Tower (EQT032)**

Drift eliminators are employed to reduce the drift and subsequently the entrained contaminants in the droplets from cooling towers. The drift eliminators remove as many droplets as practical from the air stream before exiting the tower. The drift eliminators used in cooling towers rely on inertial separation caused by direction changes while passing through the eliminators.

Types of drift eliminator configurations include herringbone (blade-type), wave form, and

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cellular (or honeycomb) designs. The cellular units generally are the most efficient. Drift eliminators may include various materials, such as ceramics, fiber reinforced cement, fiberglass, metal, plastic, and wood installed or formed into closely spaced slats, sheets, honeycomb assemblies, or tiles. The materials may include other features, such as corrugations and water removal channels, to enhance the drift removal further.

The RBLC database provided drift eliminators to be the best control technique for PM<sub>10</sub> emissions from cooling towers. TopChem will install high efficiency drift eliminators with a maximum drift rate of 0.001% as BACT.

### **BACT ANALYSIS for Flare (FL-16-1; EQT034)**

The process flare will control emissions from process startups, shutdowns, and railcar maintenance. The flare will process any hydrocarbon vapor released from pressure relief mechanisms in the event of a plant unit upset or during a power failure. The combustion emissions from the flares will include PM, CO, VOCs, and CO<sub>2e</sub>.

TopChem will comply with the Louisiana Non-NSPS Flare Requirements. The general provisions specify that flares must maintain heating value above 300 BTU/scf which ensures maximum destruction of the waste gas stream. Also, the regulation requires a corrective action plan for re-lighting.

TopChem will comply with the Louisiana Non-NSPS Flare Requirements as all the requirements are technically feasible. The RBLC identified flare design, work practice requirements, and good combustion practices as BACT for CO, PM, and CO<sub>2e</sub>. Compliance with these flare performance standards is consistent with good combustion practices and flare design. Additionally, the facility will have a plan in place to minimize startup and shutdown emissions, and therefore, TopChem proposes good combustion practices and work practice standards as BACT for the flares including startup and shutdown BACT for the process flare.

### **BACT FOR FLARES**

Pollutant	Available Control	Selected BACT	as	Negative Impacts	Control Efficiency
PM, CO, and CO <sub>2e</sub>	Good combustion practices and work practice standards	Yes		NA	98%

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### **CO2SC16-1 CO2 STRIPPER COLUMN (EQT031) CO<sub>2</sub> VENT**

The CO<sub>2</sub> stripper column overhead vapors consist mostly of steam and CO<sub>2</sub>. Good operating practices and CO<sub>2</sub> recover and reuse were identified as early as 2015. Under the current facility design, the stripper overhead vapors are vented to the atmosphere. To minimize the emissions from the CO<sub>2</sub> blow off. TopChem proposes a limit of 0.29 tons of CO<sub>2</sub>/metric ton of NH<sub>3</sub> produced and good operating practices.

### **AMMONIA CONVERTER START-UP HEATER (SUH-16-1, EQT030) BACT ANALYSIS**

The Ammonia Converter Start-Up Heater Stack is only used for 148 hours per year at approximately 20 MM BTU/hr. Given the limited use, annual emissions of PM<sub>2.5</sub>, NO<sub>x</sub>, and CO are 0.01, 0.25, and 0.12 tons per year, respectively. TopChem is unaware of any control technology that would be cost feasible for this level of emissions.

TopChem proposes use of pipeline quality natural gas and good combustion practices as BACT, the only effective method of reducing CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions from a start-up heater is energy efficiency measures. Therefore, TopChem concludes that Energy Efficiency Measures are the only feasible control for the heater.

## **B. ANALYSIS OF AMBIENT AIR QUALITY**

Prevention of Significant Deterioration regulations require an analysis of ambient air quality for those pollutants to be emitted in significant amounts from a proposed facility. PM<sub>2.5</sub> and CO are pollutants of concern in this case.

AERMOD modeling of PM<sub>2.5</sub> and CO emissions from the proposed project indicates that the maximum offsite ground level concentrations of these pollutants will be below their respective significant impact levels and preconstruction monitoring levels. Therefore, preconstruction monitoring, refined NAAQS modeling, and increment consumption analyses were not required.

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### **C. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ANALYSIS**

Because AERMOD modeling analyses indicated concentrations of each pollutant would be below its significant impact level, refined NAAQS modeling was not required.

### **D. PSD INCREMENT ANALYSIS**

Because AERMOD modeling analyses indicated concentrations of each pollutant would be below its significant impact level, PSD increment modeling was not required.

### **E. SOURCE RELATED GROWTH IMPACTS**

Operation of this facility is not expected to have any significant effect on residential growth or industrial/commercial development in the area of the facility. No significant net change in employment, population, or housing will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with Vanguard Synfuels LLC's proposal. Secondary growth effects will include 1700 temporary construction related jobs and approximately 80 permanent jobs.

### **F. SOILS, VEGETATION, AND VISIBILITY IMPACTS**

There will be no significant impact on area soils, vegetation, or visibility.

### **G. CLASS I AREA IMPACTS**

The Federal Land Manager (FLM) is responsible for evaluating a facility's projected impact on the Air Quality Related Values (AQRV) (e.g., visibility, sulfur and nitrogen deposition, any special considerations concerning sensitive resources, etc.<sup>1</sup>) and recommending that LDEQ either approve or disapprove the facility's permit application based on anticipated impacts. The FLM also may suggest changes or conditions on a permit. However, LDEQ makes the final decision on permit issuance. The FLM also advises reviewing agencies and permit applicants about other FLM concerns, identifies AQRV and assessment parameters for permit applicants, and makes ambient monitoring recommendations.

If LDEQ receives a PSD or NNSR permit application for a facility that "may affect" a Class I

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<sup>1</sup> See <http://www2.nature.nps.gov/air/Permits/ARIS/AQRV.cfm>.

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area, the FLM charged with direct responsibility for managing these lands is notified.

The meaning of the term “may affect” is interpreted by EPA policy to include all major sources or major modifications which propose to locate within 100 kilometers (km) of a Class I area. However, if a major source proposing to locate at a distance greater than 100 km is of such size that LDEQ or the FLM is concerned about potential impacts on a Class I area, LDEQ can ask the applicant to perform an analysis of the source’s potential emissions impacts on the Class I area. This is because certain meteorological conditions, or the quantity or type of air emissions from large sources located further than 100 km, may cause adverse impacts. In order to determine whether a source located further than 100 km may affect a Class I area, LDEQ uses the Q/d approach.

Q/d refers to the ratio of the sum of the net emissions increase (in tons) of PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and H<sub>2</sub>SO<sub>4</sub> to the distance (in kilometers) of the facility from the nearest boundary of the Class I area.

$$Q/d = \frac{PM_{10(NEI)} + SO_{2(NEI)} + NO_{X(NEI)} + H_2SO_{4(NEI)}}{\text{Class I km}}$$

Where:

PM <sub>10(NEI)</sub>	=	net emissions increase of PM <sub>10</sub>
SO <sub>2(NEI)</sub>	=	net emissions increase of SO <sub>2</sub>
NO <sub>x(NEI)</sub>	=	net emissions increase of NO <sub>x</sub>
H <sub>2</sub> SO <sub>4(NEI)</sub>	=	net emissions increase of H <sub>2</sub> SO <sub>4</sub>
Class I km	=	distance to nearest Class I area (in kilometers)

If  $Q/d \geq 4$ , LDEQ will formally notify the FLM in accordance with LAC 33:III.504.E.1 / LAC 33:III.509.P.1.

In this instance,

$$Q/d = \frac{12.36}{350} + \frac{1.09}{350} + \frac{34.96}{350} + \frac{0}{350} = 0.14$$

The nearest Class I area is 350 kilometers from the site, therefore this facility will not adversely impact visibility in Breton National Wildlife Refuge/Caney Creek Wilderness Area, the nearest Class 1 area.

## **PRELIMINARY DETERMINATION SUMMARY**

**TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
TopChem Pollock, LLC  
Pollock, Grant Parish, Louisiana  
PSD-LA-815  
July 15, 2016**

### **H. TOXIC EMISSIONS IMPACT**

The selection of control technology based on the BACT analysis did not include consideration of control of toxic emissions.

### **V. CONCLUSION**

The Air Permits Division has made a preliminary determination to approve the construction of the ammonia production facility at 737 Abe Hall Road near Pollock in Grant Parish, Louisiana, subject to the attached specific and general conditions. In the event of a discrepancy in the provisions found in the application and those in this Preliminary Determination Summary, the Preliminary Determination Summary shall prevail.

## **SPECIFIC CONDITIONS**

**TopChem Pollock, LLC Facility  
Agency Interest No.: 3133  
TopChem Pollock, LLC  
Pollock, Grant Parish, Louisiana  
PSD-LA-815**

1. Comply with the Louisiana General Conditions as set forth in LAC 33:III.537. [LAC 33:III.537]
2. The permittee is authorized to operate in conformity with the specifications submitted to the Louisiana Department of Environmental Quality (LDEQ) as analyzed in LDEQ's document entitled "Preliminary Determination Summary" dated July 15, 2016 and subject to the following emissions limitations and other specified conditions. Specifications submitted are contained in the application and Emission Inventory Questionnaire dated March 15, 2016, along with supplemental information dated June 9, July 1, and July 13, 2016.
3. CO<sub>2e</sub> emissions from the entire facility are limited to 1.01 tons per metric ton of ammonia produced (annual average). To demonstrate compliance with this limit, the permittee shall record the ammonia production monthly. CO<sub>2e</sub> emissions shall be recorded in accordance with the Mandatory Reporting of Greenhouse Rule (40 CFR 98). All records shall be maintained onsite for at least five years and be available for inspection by LDEQ.
4. For EQTFL1-16-1 - Process Flare:  
  
Flare shall not operate more than 4 hours above normal firing rate in any 24 consecutive hours and 148 hours per year. Keep records of the total hours each day, as well as the total hours for the last twelve months. Make records available for inspection by DEQ personnel.
5. The CT-16-1 Cooling Water Tower (EQT032) shall be equipped with high efficiency drift eliminator with drift factor of 0.001 %.

**TABLE I: BACT COST SUMMARY**

**TopChem Pollock, LLC Facility  
 Agency Interest No.: 3133  
 TopChem Pollock, LLC  
 Pollock, Grant Parish, Louisiana  
 PSD-LA-815**

Control Alternatives		Availability/ Feasibility	Negative Impacts (a)	Control Efficiency	Emissions Reduction (TPY)	Capital Cost (\$)	Annualized Cost (\$)	Cost Effectiveness (\$/ton)	Notes
<b>Source ID – Description (EQT #)</b>									
Pollutant	Description of Alternative Control #1								
	Description of Alternative Control #2								
Pollutant	Description of Alternative Control #1								
	Description of Alternative Control #2								
<b>Source ID – Description (EQT #)</b>									
Pollutant	Description of Alternative Control #1								
	Description of Alternative Control #2								
Pollutant	Description of Alternative Control #1								
	Description of Alternative Control #2								
Notes: a) Negative impacts: 1) economic, 2) environmental, 3) energy, 4) safety									

**TABLE II: AIR QUALITY ANALYSIS SUMMARY**

**TopChem Pollock, LLC Facility  
 Agency Interest No.: 3133  
 TopChem Pollock, LLC  
 Pollock, Grant Parish, Louisiana  
 PSD-LA-815**

Pollutant	Averaging Period	Preliminary Screening Concentration (µg/m³)	Level of Significant Impact (µg/m³)	Significant Monitoring Concentration (µg/m³)	Background (µg/m³)	Maximum Modeled Concentration (µg/m³)	Modeled + Background Concentration (µg/m³)	NAAQS (µg/m³)	Modeled PSD Increment Consumption (µg/m³)	Allowable Class II PSD Increment (µg/m³)
PM <sub>10</sub>	24-hour	NA	5	10	NA	NA		150		30
	Annual	NA	1	-	NA	NA		50		17
PM <sub>2.5</sub>	24-hour	0.77	1.2	4	-	-	-	35		9
	Annual	0.04	0.3	-	-	-	-	12		4
SO <sub>2</sub>	3-hour	NA	25	-	NA	NA	NA	1300		512
	24-hour	NA	5	13	NA	NA	NA	365		91
	Annual	NA	1	-	NA	NA	NA	80		20
NO <sub>x</sub>	1-hour	NA	7.5	-	-	-	-	188		-
	Annual	NA	1	14	-	-	-	100		25
CO	1-hour	1536.85	2000	-	-	-	-	40,000		-
	8-hour	446.47	500	575	-	-	-	10,000		-
Lead	3-month	NA	-	0.1	NA	NA	NA	1.5	-	-