HESS Department

Marathon Petroleum Company LP

1001 S. Oakwood
Detroit, MI 48217-1319
Main No.: 313.843.9100
Fax: 313.297.6221

February 21, 2020

Mr. David Bell
Director
Buildings, Safety Engineering & Environmental Department
City of Detroit
2 Woodward Avenue, Room 401
Detroit, MI 48226

Re: Bulk Solid Materials Storage Request for Limited Variance Application, Marathon Petroleum Company LP, Detroit, Michigan

Dear Mr. Bell:

INTRODUCTION

In accordance with Section 22-5-60 of the City of Detroit's Bulk Solid Material Ordinance (Ordinance), [1] Marathon Petroleum Company LP (MPC) is submitting a request for variance application covering bulk material processing and handling operations at its petroleum refinery located at 1001 S. Oakwood Avenue in Detroit (the Detroit Refinery). Specifically, MPC requests variance from a portion of the following section of the Ordinance:

Sec. 22-5-42	Enclosure Requirements

Please note that this variance request is more limited in scope than the request submitted by MPC on August 31, 2018. Background information supporting the request along with the basis for the variance request are provided below. Analytical data supporting the variance request is provided in the attached technical report.

BACKGROUND

On August 31, 2018, MPC submitted a Certificate of Operation application covering bulk material processing and handling operations at its Detroit Refinery. Pursuant to Section 22-5-60 of the Ordinance, MPC concurrently submitted a request for variance from the following provisions of the Ordinance:

Sec. 22-5-16(c)	Opacity measurement test method
Sec. 22-5-20(a)	Wind monitor location
Sec. 22-5-22(d)	Rumble strips for outgoing material transport trucks
Sec. 22-5-29	Roadway cleaning
Sec. 22-5-40	Enclosure of carbonaceous bulk solid materials
Sec. 22-5-41	Enclosure plan
Sec. 22-5-42	Enclosure requirements
Sec. 22-5-71	Enclosure deadline

[1] Article V, Chapter 22 of the 1984 Detroit City Code, amended on October 31, 2017.

Sec. 22-5-72 Enclosure reporting

On April 22, 2019, the Detroit Building, Safety Engineering & Environmental Department (BSEED) denied the variance request,[2] stating that the requirements of the variance application had not been fully met, citing the following sections of the Ordinance:

- **22-5-61(b) A description of the process or activity for which the variance is requested, including pertinent data on location, size, and the population and geographic area affected by, or potentially affected by, the process or activity;**

  BSEED Statement – Applicant must provide additional description of the *"demographics of the population or the geographic area potentially affected by the process or activity"*.

- **22-5-61(d) A demonstration that issuance of the variance will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses;**

  BSEED Statement – Applicant must provide analytical data or air monitoring data that conclusively shows that there are no fugitive dust emissions from the coke pit; demonstrate that the currently used opacity test method is equivalent to the Ordinance-required method; demonstrate that the existing wheel wash station provides comparable results to the Ordinance-required combination of rumble strips and a wheel wash station; demonstrate that a daily street sweeping schedule would not result in greater particulate emission reductions than the currently conducted twice per month road cleaning schedule.

The April 22 letter further states that a new application for a variance may be submitted should MPC *"obtain new evidence or proof of changed conditions"*.

REDUCTION TO VARIANCE REQUEST

Though it was part of the original 2018 variance request, MPC no longer seeks variance from the opacity measurement test method (Section 22-5-16c), outgoing material truck rumble strip requirements (Section 22-5-22d), or the road cleaning requirements (Section 22-5-29) of the Ordinance. MPC is currently and will continue to operate its bulk solid material processing and handling operations in accordance with these three requirements.

Further, MPC no longer requests a variance from Section 22-5-20(a), which requires bulk solid material facilities to install, operate, and maintain a weather station or other permanent device to monitor and log wind speed and direction. The section specifically requires that the wind monitor be located at *"an unobstructed, unsheltered area, centrally positioned in relation to the storage piles, and at a minimum height of 15 feet above ground level"*.

---

[2] Letter from David Bell, BSEED Director, to Greg Bennethum, MPC, BSEED Case No. MRC2018-02525, April 22, 2019.

Based on the layout of equipment in the coke processing and handling area, positioning a wind monitor within this section of the Detroit Refinery is not feasible. There is no part of the coke processing and handling area that is free from the turbulent effects of buildings or other structures, which is a requirement of the Ordinance.

Notwithstanding the above siting limitation, MPC already operates two meteorological stations that support air permit-required ambient pollution monitoring at the Detroit Refinery.[3] The two meteorological stations, which are located within the Detroit Refinery property boundary and which continuously monitor wind direction and speed, have been in operation since 2012. The maintenance and reporting activities associated with these stations are conducted by a 3rd party.

During siting in 2012, the two wind monitors were strategically located to:

- Limit the potential for air turbulence that can occur when a wind monitor is located adjacent to buildings or other structures. Properly siting a wind monitor away from turbulence-producing structures is necessary to properly assess predominant wind flow patterns at the Detroit Refinery.

- Deliver concurrent measurements of wind flow patterns at the Detroit Refinery (i.e., redundant data should a malfunction of one monitor occur), while also accounting for minor variations in wind flow that may occur across the refinery.

- Provide a secure location that will not interfere with refinery operations or create a safety hazard.

Because they're located on Detroit Refinery property, the redundant, quality-assured wind data collected at the two existing monitors are effectively representative of wind speed and direction at the coke processing and handling area. Consequently, the existing wind monitors demonstrate equivalency to the Section 22-5-20(a) requirement and no variance is needed. Additional technical information regarding the representativeness of the wind monitors is provided in Section 1 of **Attachment B**.

APPLICATION FOR VARIANCE

As directed by the April 22 letter and in accordance with Section 22-5-60 of the Ordinance, this letter and supporting attachments serve as a new application for variance from a limited portion of Section 22-5-42. The required variance application form with the application fee of $362 is included as **Attachment A**.

Bulk material processing and handling operations at the Detroit Refinery are regulated under Renewable Operating Permit No. MI-ROP-A9831-2012c (the ROP), issued by EGLE on July 8, 2016. Based on requirements set forth in the ROP, particulate matter (PM) emissions from the coke processing and handling operation are well-controlled and already comply with the majority of applicable fugitive emission control provisions of the Ordinance. Specifically, the first stage of the coke processing and handling operation occurs in a pit that has an impermeable concrete floor and is surrounded on all sides by 30-foot high walls to shield the coke from wind.[4] The walls are equipped with a high volume sprinkler system to assist in maintaining the moisture content of the coke to a level that prevents dust from becoming airborne. After

---

[3] The Michigan Department of Environment, Great Lakes and Energy (EGLE) has reviewed and approved the meteorological monitors being used at the Detroit Refinery, and continues to review data quality reports for the monitors.

[4] The ROP prohibits the height of petroleum coke piles to lower than the 30' wall height.

leaving the pit, the coke is further processed and transferred in a fully enclosed conveyor system before being loaded into trucks. The truck loading building and conveyor system are completely enclosed and controlled with a high efficiency air filtration system. All enclosed areas also have a water wash system.

Though the coke pit is not equipped with a roof, as specified under Section 22-5-42(a), the coke processing, handling, and off-site trucking operation at the Detroit Refinery already meets or exceeds the emissions control intent of the Ordinance. Moreover, the installation of a roof on the existing coke pit will create a significant safety hazard to on-site workers due to entrained steam (heat) and a lack of visibility from the steam. Therefore, in accordance with Section 22-5-60, MPC seeks a variance from the requirement to install a roof over the coke pit.

A comprehensive technical report supporting the variance request is enclosed in **Attachment B**. The technical report provides a detailed description of the coke processing and handling operation at the Detroit Refinery, including substantive "state of the art" emission reduction measures that MPC implemented during the installation of the operation in 2012 – well before the promulgation of similar requirements in the Ordinance. The technical report also provides the methodology and results of numerous technical and data gathering analyses that validate the effectiveness of the existing emission reduction measures. As demonstrated in the technical report, the Detroit Refinery's coke processing and handling operations do not pose a health threat or nuisance to surrounding communities. This is further substantiated through high-definition video of the coke processing and handling operations, which is being made available to the BSEED and general public concurrent with this application. Complete enclosure of the coke staging area would pose a significant safety risk to on-site workers. Furthermore, it was determined to be technically infeasible by the engineering design firm that built the unit.

In accordance with the ROP, MPC has implemented an EGLE-approved Fugitive Dust Control Plan (FDC Plan) that satisfies the applicable provisions of the Natural Resources and Environmental Protection Act (Act) and Michigan's Administrative Rules for Air Pollution Control. The FDC Plan is provided in the attached technical report. In accordance with Section 22-5-18(m), a fact sheet summarizing MPC's fugitive dust control program has been developed for the City's website and is also included as **Attachment C**.

-oOo-

In summary, MPC has reduced the scope of the variance request and has addressed the analytical data deficiencies cited in the BSEED's denial letter. If you have any questions regarding this submittal or require any additional supporting information, please do not hesitate to contact me at 313-297-6346.

Sincerely,

Jeremy W. Beasley
Environmental Supervisor

Attachments

Attachment A

Application Form – Application for a Variance as Provided for by Chapter 22 Article V. Bulk Solid Material Division 5. Variance

Marathon – Detroit Refinery

E2 - BULK SOLID MATERIALS VARIANCE APPLICATION

Date Submitted: February 21, 2020 Permit No.#: _____

Location Address: 1300 S. Fort Street, 1001 S. Oakwood Avenue, 2700 Toronto Street, 301 S. Fort Street

City: Detroit State: MI Zip: 48217

PROPERTY OWNER ■ Applicant

Name: Marathon Petroleum Company LP

Owner Address: 1001 S. Oakwood Avenue

City: Detroit State: MI Zip: 48217

Email Address: jwbeasley@marathonpetroleum.com

Phone: (313) 297-6346 Mobile: _____

OPERATOR ☐ Applicant

Name: _____

Operator Address: _____

City: _____ State: _____ Zip: _____

Email Address: _____

Phone: _____ Mobile: _____

CONTACT PERSON REGARDING MEETING DATE

Name: Jeremy W. Beasley, Environmental Supervisor Phone: (313) 297-6346

I hereby make application for Administrative Hearing seeking modification to Code Provisions, or the approval through administrative procedure, as required in the Code, from the Building Official, for the following.

Code, Section No. and Code requirement	
Reason for Noncompliance	
Alternate Method Proposed	
How is the alternate Equivalent to Code	

(Attach any additional informational sheets if needed to present case)

Owner's and Operator's Affidavit

State of Michigan } **ss.**
County of Wayne }

The undersigned being duly sworn, deposes and says that the foregoing statements and answers herein contained and accompanied information and date are in all respects true and correct to the best of my knowledge and belief.

Operator: _____

Subscribed and sworn before me this _____ day of _____ 20____

Signature: _____ My commission expires: _____
(Notary Public Wayne County, Michigan)

Owner: David E. Leavy

Subscribed and sworn before me this 21st day of February 2020

Signature: C Spencer My commission expires: _____
(Notary Public Wayne County, Michigan)

C SPENCER
Notary Public - State of Michigan
Wayne County
My Commission Expires Jan 20, 2022
Acting in the County of Wayne

FOR DEPARTMENT USE ONLY

The above applicant has requested a variance under Chapter 22, Article V, Division 5 of the City Code and is entitled to an Administrative Hearing. A report will be prepared and submitted seven (7) days from the submitted date for scheduling.

Received by: _____

Assigned to: _____

Hearing #: _____

E2 - BULK SOLID MATERIALS VARIANCE APPLICATION

Application for a Variance as Provided for by Chapter 22 Article V
Bulk Solid Material Division 5. Variances

Please complete the attached form, including the requirements listed below. Return all items requested. You will be required to submit fee at the time of hearing. Payment can be made by credit card, check, money order, and or cash. (Check can be made payable to "Treasurer, City of Detroit, credit cards accepted are "Visa" or "MasterCard" Credit or Debit Card).

The current fee is **$362.00** for the first item, **$88.00** for each additional item, and **$175.00** for a rehearing.

Return to: *Environmental Affairs in Room 401*

For Modification to Code Provisions: Please submit a narrative describing:

A. The provision or requirements of the Code from which the variance is requested;

B. A description of the facility for which the variance is requested, including pertinent data on location, size, and the population and geographic area affected by, or potentially affected by the facility;

C. The quantity and types of materials used in the process or activity in connection with which the variance is requested, as appropriate;

D. A demonstration that issuance of the variance will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses;

E. A statement explaining:

1. Why compliance with the regulations imposes an arbitrary or unreasonable hardship;
2. Why compliance cannot be accomplished during the required timeframe due to events beyond the facility owner or operator's control such as permitting delays or natural disasters; or
3. Why the proposed alternative measure is superior or preferable.

F. A description of the proposed methods to achieve compliance with the regulations and a timetable for achieving that compliance, if applicable;

G. A discussion of alternate methods of compliance and of the factors influencing the choice of applying for a variance;

H. A statement regarding the person's current status as related to the subject matter of the variance request;

I. For any request for a variance from the enclosure deadline set forth in section 22-5-71, if the applicant is not the owner or operator of a facility operating on the effective date of the ordinance, the applicant must also submit all of the following:

1. Fugitive dust monitoring reports for the four months before the date of the variance application, and
2. In the event that the variance is granted, monthly fugitive monitoring reports for the duration of the variance which shall be due fourteen (14) days following the end of the month which the report covers.

The required monthly fugitive dust reports shall be submitted in an electronic format as specified in the variance

Attachment B

Technical Information and Analyses Supporting an Application for Variance

Marathon – Detroit Refinery

Marathon – Detroit Refinery

City of Detroit – Bulk Solid Material Ordinance

Technical Information and Analyses Supporting an Application for Variance

February 21, 2020

Application for Variance

February 21, 2020

Contents

1.0 Introduction 1

A. Bulk Solid Material Ordinance Applicability and Compliance 2

Section 22-5-40 Enclosure Requirements 4

Section 22-5-20(a) Wind Monitoring 4

B. Provision for Variance 9

2.0 Variance Demonstration 11

A. The provision or requirements of the Code from which the variance is requested; 11

B. Description of the process or activity for which the variance is requested, including pertinent data on location, size, and the population and geographic area potentially affected by the process or activity; 11

Process Description and Emissions Control Strategy 11

Location and Size of the Storage, Handling, and Off-site Trucking Operation 12

Population and Geographical Area potentially affected by the Storage, Handling, and Off-site Trucking Operation 13

C. Quantity and type of materials used in the process or activity in connection with which the variance is requested; 15

D. Demonstration that issuance of the variance will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses; 16

Coker Unit Monitoring Study 16

Air Quality Impact Analysis 20

Analysis of Community and Refinery Perimeter Monitoring 24

Material Moisture Content Evaluation 26

Visible Emissions Monitoring 29

E. A statement explaining: 30

(1) Why compliance with the regulations imposes an arbitrary or unreasonable hardship; or 30

(2) Why compliance cannot be accomplished during the required timeframe due to events beyond the facility owner or operator's control such as permitting delays or natural disasters; or 30

(3) Why the proposed alternative measure is superior or preferable. 31

F. A description of the proposed methods to achieve compliance with the regulations and a timetable for achieving that compliance, if applicable; 32

G. A discussion of the alternate methods of compliance and of the factors influencing the choice of applying for a variance; 32

H. A statement regarding the person's current status as related to the subject matter of the variance request; 33

List of Figures

Figure 1 Location of the Petroleum Coke Processing, Handing, and Off Site Trucking Operation 2
Figure 2 Location of Existing Detroit Refinery Wind Monitors 5
Figure 3 Wind Rose – Wind Flow Measured at the Southeast Refinery Monitor (2016 – 2018) 7
Figure 4 Wind Rose – Wind Flow Measured at the Southwest Refinery Monitor (2016 – 2018) 8
Figure 5 Location of the Petroleum Coke Processing, Handling, and Off-Site Trucking Operation 13
Figure 6 Detroit Refinery and Surrounding Communities 14
Figure 7 Location of Ambient Monitors Used in the Coke Handling Monitoring Study 17
Figure 8 Modeled 24-Hour PM_{10} Impacts Associated with Coke Handling Operations 22
Figure 9 Modeled 24-hour and Annual $PM_{2.5}$ Impacts from Coke Handling Operations 23
Figure 10 Parametric Ambient Monitoring Station Locations 25
Figure 11 Water Sprays Controlling Transfer of Coke from the Oven to the Pit 28
Figure 12 Transfer of Coke from the Pit to the Dewatering Pad 28
Figure 13 Staging of Wet Coke Prior to Transfer to the Enclosed Conveying System 29

List of Tables

Table 1 Population Statistics for Communities Surrounding the Detroit Refinery 15
Table 2 Real-Time PM_{10} Samples Analysis Results for the Entire Sampling Period 18
Table 3 Significant Impact Levels and National Ambient Air Quality Standards 21
Table 4 Real-Time PM_{10} Samples Analysis Results for the Entire Sampling Period 26

List of Appendices

Appendix A Fugitive Dust Control Plan Enforcing Control of the Petroleum Coke Processing, Handling, and Off-Site Trucking Operation

Appendix B Technical Report – Examination of the Potential for Adverse Off-Site Impacts of Petroleum Coke Particulate at the Marathon Petroleum Detroit Refinery, Clean Air Engineering, Inc.

Appendix C Technical Report – Dispersion Modeling Analyses of Potential Emissions of Petroleum Coke Processing and Handling Operations

Appendix D Electronic Submittal (USB Drive) of: 1) Records of Visible Emissions Observations; 2) Dispersion Modeling Input/Output Files

Appendix E Review of Existing Emissions Controls – Coking.com

1.0 Introduction

Marathon Petroleum Company LP (MPC) owns and operates a petroleum refinery located at 1300 South Fort Street, Detroit (the Detroit Refinery). Operations at the Detroit Refinery include multiple process units necessary to process crude oil into gasoline, diesel, intermediate products, and petroleum coke. The addition of the Coker Unit & petroleum coke product stream was authorized in 2012 as part of Renewable Operating Permit No. MI-ROP-A9831-2012c (the ROP), issued by the Michigan Department of Environment, Great Lakes, and Energy, Air Quality Division (EGLE). During the original design and selection process of the Coker Unit, MPC installed state of the art air emissions controls technology in order to ensure the lowest achievable emissions of particulate matter from its petroleum coke handling operation. These controls continue to be considered the best in the refining industry for petroleum coke handling at a delayed coker unit. Petroleum coke is not stored in open-air piles at the Detroit Refinery, but is enclosed on 4 sides within a 30' wall. Further, long term storage of petroleum coke does not occur at the Detroit Refinery.

MPC employs a comprehensive set of controls to minimize particulate matter emissions from petroleum coke transfer and loading operations. As discussed further in **Section 2**, these include: passing the coke through an intense water curtain as it exits the coke drum into the coke pit where it is submerged in water; an enclosed conveyer systems with high efficiency air filtration controls; and an enclosed truck loading building with a vacuum system, high efficiency air filtration, a wheel wash, and rumble strips.

On April 22, 2019, the Detroit Building, Safety Engineering & Environmental Department (BSEED) denied MPC's request for variance from nine (9) provisions of the City of Detroit's Bulk Solid Material Ordinance (Ordinance).[1] The basis of the denial was that MPC must further describe the demographics of the population or geographic area potentially affected by the process, and must submit analytical or air monitoring data that conclusively shows that there are no fugitive dust emissions from the coke pit in order to meet the requirements of the variance application. To address BSEED concerns, MPC has updated the variance request to include more detailed demographic information, ambient air monitoring data, dispersion modeling analyses, visible emissions monitoring data, and additional details regarding the comprehensive emissions control strategy being employed at the petroleum coke handling operation. Further, MPC is narrowing the scope of the variance request to one (1) partial variance and one (1) alternative location request, as described in the following section.

Air emission sources at the Detroit Refinery, including the Coker Unit and Coke Pit, are regulated under the ROP. The ROP sets stringent control technology requirements, emission limitations, and operational restrictions for emission units at the Detroit Refinery, including the coke processing, handling, and off-site trucking operation. The ROP further requires that MPC implement an EGLE-approved Fugitive Dust Control (FDC) Plan that addresses the coke processing, handling, and off-site trucking operation. The Detroit

[1] Letter from David Bell, BSEED Director, to Greg Bennethum, MPC, BSEED Case No. MRC2018-02525, April 22, 2019.

Refinery has been operating under a comprehensive FDC Plan since the Coker Unit commenced operation in 2012.

The location of the coke processing, handling, and off-site trucking operation is shown in **Figure 1**. A copy of the EGLE-approved FDC Plan is provided in **Appendix A**.

Figure 1 **Location of the Petroleum Coke Processing, Handing, and Off Site Trucking Operation**

A. Bulk Solid Material Ordinance Applicability and Compliance

On October 31, 2017, Chapter 22 of the 1984 Detroit City Code was amended to include provisions covering the storage, handling, and off-site trucking of bulk solid materials. The provisions are codified in Article V of Chapter 22, commonly referred to as the Bulk Solid Material Ordinance (Ordinance). Pursuant to Section 22-5-5 of the Ordinance, petroleum coke is classified as a carbonaceous bulk solid material and is, therefore, subject to regulation under the Ordinance regardless of the amount stored or handled. Consequently, the coke processing, handling, and off-site trucking operation currently operating at the Detroit Refinery is

subject to regulation under the Ordinance which, pursuant to Section 22-5-70, has staged implementation requirements.

Bulk solid material operations at the Detroit Refinery largely already meet or exceed the requirements of the Ordinance, including the following:

- MPC prevents the discharge of visible emissions into the ambient air and does not allow visible emissions beyond the property line. (Sec. 22-5-15)
- MPC does not allow the emission of fugitive dust over roads, piles, or material handling operations to exceed 5% opacity, nor visible emissions at the property boundary to exceed 10% opacity; and shall conduct visible emissions monitoring. (Sec. 22-5-16)
- MPC operates under an EGLE-approved fugitive dust plan. (Sec. 22-5-17,18, and Sec. 22-5-41)
- MPC operates four continuous Federal Equivalent Method (FEM) PM_{10} monitors. (Sec. 22-5-19)
- MPC operates two continuous wind monitors at 15 feet above ground level. (Sec. 22-5-20)
- All conveyors and transfer points are enclosed and vented to air pollution control equipment. (Sec. 22-5-21 and 22-5-42)
- Transport trucks are limited to a travel speed of 8 miles per hour, pass through a wheel wash system and over rumble strips to free any loose material, and are driven over paved roads within one quarter mile of the refinery perimeter. (Sec. 22-5-22)
- Transport trucks are covered prior to leaving the refinery. (Sec. 22-5-23)
- If a transport truck leaks material onto an internal road, MPC cleans the affected road within one hour using a street sweeper or water. (Sec. 22-5-24)
- Transport trucks are loaded via gravity-fed chute in an enclosed structure controlled by a fabric filter dust collector to prevent emissions. (Sec. 22-5-25 and 22-5-42)
- MPC uses a street sweeper to clean roads within one quarter mile of the refinery according to the required schedule. (Sec. 22-5-29)
- MPC maintains all on-site roads, routinely removing spilled material. (Sec. 22-5-30)
- MPC maintains all records required under this section, which will be submitted to the BSEED on a quarterly basis. (Sec. 22-5-31)

MPC has reviewed its prior Variance submittal, dated August 31, 2018, and has simplified its request to one (1) partial variance. MPC is also providing information confirming that two existing wind monitoring stations at the Detroit Refinery meet or exceed the siting requirements of the Ordinance.

- Full enclosure of Coke Pit – MPC is requesting BSEED approval of its partially enclosed structure with existing air emissions controls as equivalent to a fully enclosed structure.

As briefly described below and further detailed in subsequent sections of this report, the long-running operation of monitoring and emissions mitigation strategies at the coke processing, handling, and off-site trucking operation effectively fulfills the intended purpose of the Ordinance.

Section 22-5-40 Enclosure Requirements

Pursuant to Section 22-5-40, *"The owner or operator of a carbonaceous bulk solid material facility shall maintain all carbonaceous bulk solid material in fully enclosed structures in accordance with the enclosure requirements set forth in this division."*

Detailed enclosure requirements are set forth in Section 22-5-42. Compliance with the enclosure requirements and additional related ROP requirements is as follows:

- In the first stage of the processing and handling operation, coke exits the drums passing through an intense water curtain follow by submersion in a pit full of water. The pit has an impermeable concrete floor and is surrounded on all sides by 30-foot high walls. (Sec. 22-5-42(a))
- All coke processing operations in the pit are conducted below the height of the walls to shield the coke from wind. (Refinery ROP)
- All buildings/structures in the coke processing and handling operation were constructed in accordance with applicable building code and zoning requirements. (Sec. 22-5-42(b))
- The walls of the pit are equipped with high volume sprinkler system that assists in maintaining the moisture content of the coke at a level that prevents dust from becoming airborne. (Sec. 22-5-42(c))
- After the coke is loaded from the pit to the crusher, it is transferred in a fully enclosed conveyor system before being loaded into trucks. (Sec. 22-5-42(a))
- The truck load-out building is completely enclosed and controlled with a fabric filter dust collector. (Sec. 22-5-42(c))
- The truck load-out building entrance and exit are equipped with overlapping flaps. (Sec. 22-5-42(d))

Though not equipped with a roof – which, as will be described in this document, is not technically feasible and would introduce safety hazards for our employees – the existing enclosure coupled with comprehensive ROP-required emission control measures ensures that coke handling and processing operates in a manner that prevents emissions to the atmosphere.

Section 22-5-20(a) Wind Monitoring

Section 22-5-20(a) requires the bulk solid material facility to install, operate, and maintain a weather station or other permanent device to monitor and log wind speed and direction. The section specifically requires that the wind monitor be *"centrally positioned in relation to the storage piles, and at a minimum height of 15 feet above ground level"*.

As part of its Perimeter Air Monitoring System (PAMS) network, MPC operates two EGLE-approved meteorological stations that support air permit-required ambient pollution monitoring at the Detroit Refinery. The two meteorological stations, which continuously

monitor wind direction and speed, has been in operation since 2012. The location of the two wind monitors is shown in **Figure 2**.

Figure 2 **Location of Existing Detroit Refinery Wind Monitors**

As shown in the figure, the wind monitors are located within the Detroit Refinery property boundary, southeast and the southwest of the coke processing, handling, and off-site trucking operation. Consistent with the Ordinance, the monitors measure wind conditions at a height of at least 15 feet above ground level.

During siting in 2012, the two wind monitors were strategically located to:

- Limit the potential for air turbulence that can occur when a wind monitor is located too close to buildings and other structures.
- Deliver concurrent measurements of wind flow patterns at the Detroit Refinery (i.e., redundant data should a malfunction of one monitor occur), while also accounting for minor variations in wind flow that may occur across the refinery.

- Provide a secure location that will not interfere with refinery operations, including the use of mobile equipment, or create a safety hazard.

Graphic representation of wind conditions at the Detroit Refinery is provided in **Figure 3** (southeast wind monitor) and **Figure 4** (southwest wind monitor).

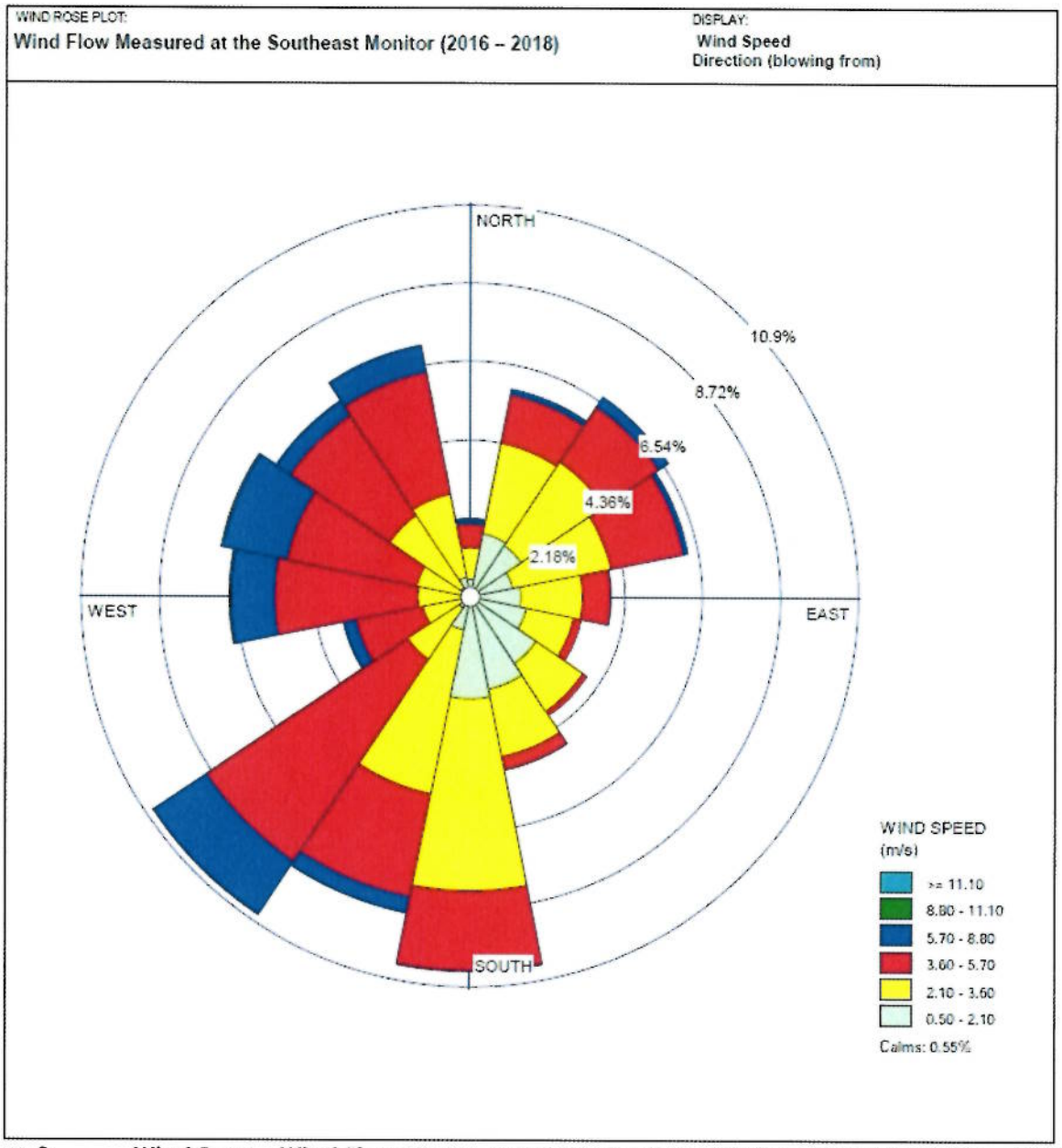

Figure 3 **Wind Rose – Wind Flow Measured at the Southeast Refinery Monitor (2016 – 2018)**

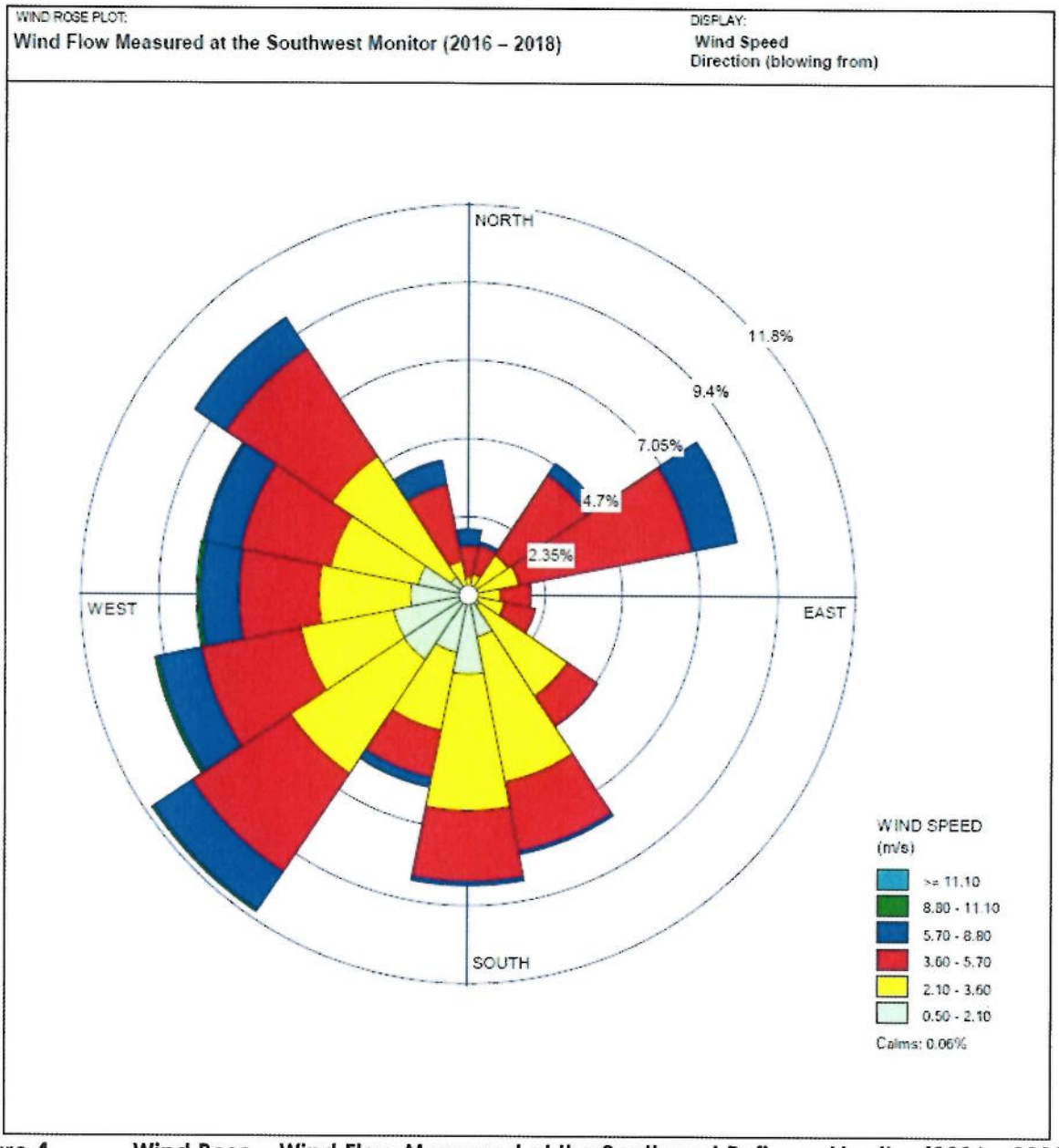

Figure 4 **Wind Rose – Wind Flow Measured at the Southwest Refinery Monitor (2016 – 2018)**

The "wind roses" illustrate wind direction and speed measured at the two monitors during the period 2016 through 2018. The consistency in wind conditions between the two monitors, as shown in the wind roses, confirms that the current monitoring locations are representative of wind conditions at the coke handling, processing, and off-site trucking operation.

Based on the layout and density of equipment in the Coker Unit, relocation of one of the existing wind monitors to this section of the Detroit Refinery is not recommended or feasible. There is no part of the Coker Unit area that is free from the turbulent effects of buildings and other structures. Installation of a 3rd wind monitor would only provide

redundant, if not skewed (due to localized turbulence), wind data that offers no additional benefit to the goals of the Ordinance.

Based on their proximity, the measurements recorded at the two existing monitors are effectively representative of wind speed and direction downwind of the coke processing, handling, and off-site trucking operation. Further, the location of the two wind monitors is optimal for tracking wind flow patterns from the Detroit Refinery. Accordingly, the two on-site wind monitoring stations in combination provide equivalent, if not more comprehensive, wind flow information than would be gathered by a "centrally-located" wind monitor, which is not feasible at this site. Therefore, the two wind monitoring stations meet the intent of Section 22-5-20.

B. Provision for Variance

Pursuant to Section 22-5-60, *"The facility owner or operator may apply to the BSEED director a variance from any requirement or provision set forth in division 2, division 3 or division 4 of this article in accordance with the provisions set for in this division 5."* Information required in support of a variance application are specified in Section 22-5-61 and include the following:

- The provision or requirements of the Ordinance from which the variance is requested.
- Description of the process or activity which the variance is requested, including pertinent data on location, size, and the population and geographic area potentially affected by the process or activity.
- Quantity and types of materials used in the process or activity in connection with which the variance is requested, as appropriate.
- Demonstration that issuance of the variance will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses.
- A statement explaining why compliance with the regulations imposes an arbitrary or unreasonable hardship; or why compliance cannot be accomplished during the required timeframe due to events beyond the facility owner or operator's control such as permitting delays or natural disasters; or why the proposed alternative measure is superior or preferable.
- A description of the proposed methods to achieve compliance with the regulations and a timetable for achieving that compliance, if applicable.
- A discussion of the alternate methods of compliance and of the factors influencing the choice of applying for a variance.
- A statement regarding the person's current status as related to the subject matter of the variance request.

Section 2 of this technical report fulfills the information requirements under Section 22-5-61 and demonstrates that on-going monitoring and emission mitigation techniques ensure that the coke processing, handling, and off-site trucking operation at the Detroit Refinery already meets the intended purpose of the Ordinance. As detailed in this report, this demonstration is supported by comprehensive ambient PM monitoring along and nearby the perimeter of the refinery, additional ambient monitoring

focused specifically on the coke processing, handling, and off-site trucking operation (including microscopic "fingerprinting" sources of measured PM concentrations), and atmospheric dispersion modeling analyses of permit-allowable emissions from the coke processing, handling, and off-site trucking operation. The methodology and results of the data gathering and technical analyses conducted in support of this demonstration are provided in this section and further detailed in related appendices.

2.0 Variance Demonstration

A. The provision or requirements of the Code from which the variance is requested;

MPC requests a variance from the following provision of the Ordinance:

Sec. 22-5-40(a) Roof Over Carbonaceous Bulk Solid Materials

B. Description of the process or activity for which the variance is requested, including pertinent data on location, size, and the population and geographic area potentially affected by the process or activity;

Process Description and Emissions Control Strategy

Processing and handling of carbonaceous materials at the Detroit Refinery is limited to the Coker Unit, which has been in operation since 2012. The Coker Unit is an integral part of Detroit Refinery fuel-producing operations.

Petroleum coke, a carbonaceous material, is a product of Coker Unit operations. The processing and handling of petroleum coke begins when high-pressure water cutters remove the petroleum coke that builds up within two drums that are associated with the Coker Unit. Emissions control begins at the on-set of the processing and handling operation, systematically described as follows:

- The petroleum coke exits the bottom of the coke drum through an intense water curtain.
- The petroleum coke then drops into a pit where it is submerged underwater.
- The coke pit is located below grade level. The dewatering pad is surrounded on all sides by 30-foot high walls to prevent wind erosion of the cooling material.
- A bridge crane transfers the coke to the adjacent pad for necessary dewatering and cooling. Cooling is accomplished by controlling the amount of time coke is allowed to be staged on the pad and ensuring that the wall-mounted sprinkling system is operating as needed to maintain coke moisture content.
- The bridge crane then loads dewatered coke from the pad into the coke feed conveyor hopper. The pad and feed hopper are also located within the area enclosed by 30-foot high walls.
- The coke feed hopper discharges coke onto a fully enclosed conveyor in the feed conveyor transfer building. From this point on, the coke is fully enclosed preventing wind erosion. All enclosures have high efficiency air filtration and water wash systems to control and prevent dust.

- The truck load-out building has a high-volume localized vacuum system to prevent dust formation while loading trucks. A wheel-wash system and rumble strips are used to reduce potential emissions associated with material track-out.

With the exception of rumble strips, which are required by the Ordinance, the emission control measures described above have been in place since 2012 and are enforceable requirements under the Detroit Refinery ROP.[2] Actual annual PM_{10} emissions from the petroleum coke processing, handling, and off-site operation, as reported to EGLE through its Michigan Air Emissions Reporting System (MAERS), averages only 0.1 tons per year using AP-42 emissions factors.

Compliance with these emission control requirements is demonstrated through visible emissions monitoring required under both the ROP and the Ordinance. Ambient air monitoring is also conducted to ensure that the operation is properly controlled and that no adverse impacts are occurring in surrounding communities.

Processing time from the completion of water cutting a coke drum to off-site shipment of the petroleum coke typically ranges from 1 to 4 days. The Ordinance was developed in response to issues associated with the historical long-term storage of exposed petroleum coke piles by non-MPC facilities located within the City of Detroit. However, not only is the temporary staging of petroleum coke at the Detroit Refinery protected from wind exposure, this type of long-term petroleum coke storage **does not occur** at the Detroit Refinery. Petroleum coke from outside sources is never received, handled, or stored at the Detroit Refinery.

High definition video of the coke processing, handling, and off-site trucking operation is also being made available to the BSEED and the general public concurrent with this variance application. The video may be viewed on the Detroit Refinery web page, which has the following address:

www.detroitrefinery.com

Location and Size of the Storage, Handling, and Off-site Trucking Operation

The location of the coke processing, handling, and off-site trucking operation is shown in **Figure 5**.

[2] Rumble strips, required by the Ordinance (but not the ROP), were installed in 2019.

Figure 5 **Location of the Petroleum Coke Processing, Handling, and Off-Site Trucking Operation**

All portions of the operation are completely enclosed except for the coke pit and dewatering pad. The lateral dimension of the coke pit and dewatering pad, which is surrounded on all sides by a 30 foot high wall, with lateral dimensions of approximately 250 feet x 135 feet.

Population and Geographical Area potentially affected by the Storage, Handling, and Off-site Trucking Operation

The Detroit Refinery is located in the Oakwood Heights neighborhood of Detroit and in the City of Melvindale. There are several industrial sources of particulate matter within two miles of the Detroit Refinery, including two steel mills, two power plants, a coke oven battery, a salt mine, a gypsum plant, and an asphalt plant. Numerous industrial facilities in the area have material handling operations, including those that handle carbonaceous

materials. The area is also characterized by commercial establishments, public areas, and residences. Aerial imagery showing the location of the Detroit Refinery and surrounding industrial, commercial, and residential communities is provided in **Figure 6.**

Figure 6 **Detroit Refinery and Surrounding Communities**

The population of surrounding communities, based on the last completed national census, is shown in **Table 1**.

Table 1 **Population Statistics for Communities Surrounding the Detroit Refinery**

Community	Population (2010 Census)
Allen Park	28,210
Boynton/Oakwood Heights	8,832
Carbon Works	655
Dearborn	98,153
Delray	2,783
Ecorse	9,512
Lincoln Park	38,144
Melvindale	10,715
River Rouge	7,903
Southwest Detroit	19,756
Springwells	15,761

MPC completed significant work as part of this Variance application to demonstrate satisfactorily that there is no anticipated impact associated with the existing configuration of the Coke storage, handling, and off-site trucking to any of the communities outside of the refinery property boundary. Section 2.D provides the full analysis; however, in summary:

- A focused ambient monitoring study demonstrates that the existing emissions control strategy for the coke processing, handling, and off-site trucking operation (30 foot high wall, material wetting, enclosures, and fabric filter dust collectors) results in no adverse air quality impact in nearby communities.
- Atmospheric dispersion modeling analyses demonstrate that the existing control strategy for the coke processing, handling, and off-site truck loading operation does not pose a health risk to nearby communities.

C. Quantity and type of materials used in the process or activity in connection with which the variance is requested;

Following is a summary of the type and quantity of material produced by the Coker Unit:

a) Type of material used in the process: Petroleum Coke

b) Approximate annual coke production: 633,188 tons/year[3]

c) Daily average staging amount:[4] 4,316 tons

[3] Average annual coke production during the years 2017 through 2019.

[4] There is no long-term storage or accumulation of petroleum coke at the Detroit Refinery. The coke processing and handling operations at the Detroit Refinery are designed such that coke is manufactured, processed, and shipped on a continuous basis. Petroleum coke typically remains in the coke pit for no more than 4 days before loading out in trucks.

D. Demonstration that issuance of the variance will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses;

Technical analyses have been conducted to demonstrate that the coke processing, handling, and off-site trucking operation does not adversely affect nearby communities. To provide the BSEED with information sufficient to approve the variance request, MPC implemented a multi-layered approach that included the following data gathering and technical analyses:

- Ambient monitoring study focused specifically on the coke processing, handling, and off-site trucking operation. The analysis included "fingerprinting" of emission sources that contribute to measured PM concentrations.
- Atmospheric dispersion modeling analyses of permit-allowable emissions from the coke processing, handling, and truck loading operation.
- Analysis of existing ambient PM monitoring data from existing ambient monitors located along the perimeter of the refinery and at the EGLE-operated NMH 48217 monitor in the neighboring community.
- Visible emissions monitoring conducted in the Coker Unit area.

The methodology and results of the technical analyses conducted in support of this demonstration are provided below.

Coker Unit Monitoring Study

To supplement the data collected through existing and on-going property boundary and community monitoring programs, MPC undertook an ambient monitoring study designed specifically to assess the potential for Detroit Refinery coke processing, handling, and off-site trucking operations to adversely impact surrounding communities. The ambient monitoring study was conducted by Clean Air Engineering, Inc. (Clean Air), a company that specializes in air quality monitoring.

Six ambient monitors were strategically located around the Detroit Refinery to allow for the measurement of upwind and downwind PM_{10} concentrations during the sampling period, which extended from May 14, 2019 through May 23, 2019. The ambient monitors – Met One Instruments e-Samplers – utilize near-forward light scattering mechanisms to measure "real time" airborne PM_{10} concentrations. The ambient monitors were also equipped with 47 mm polycarbonate filters that allowed for subsequent gravimetric and laboratory analysis of the measured concentrations. Anemometers that provided concurrent measurements of wind speed and wind direction during the sampling period were co-located alongside four of the six ambient monitors. The location of the six ambient monitors and four anemometers is shown in **Figure 7**.

Figure 7 **Location of Ambient Monitors Used in the Coke Handling Monitoring Study**

Three types of samples were collected during the study period:

1. **Coke Pit Bulk Sample** – Petroleum coke extracted from the coke pit was sent to a laboratory and subjected to computer-controlled scanning electron microscopy and energy dispersive x-ray spectrometry (CCSEM EDS). This analysis reveals the unique compositional structure of petroleum coke, both particle size distribution and chemical composition, thus providing a "fingerprint" of the petroleum coke that can be compared against the fingerprint of other particulate-generating sources in the area when assessing the types of emission sources that may be contributing to monitored concentrations.
2. **Coke Pit Air Sample** – Air samples collected directly at the coke pit wall. These samples were used to validate the petroleum coke fingerprint (i.e., confirmation that CCSEM EDS analysis of ambient monitor filters allows for subsequent fingerprint analysis downwind of the coke processing, handling, and off-site trucking operation). This phase of the study also demonstrated that airborne PM_{10}

concentrations in the coke pit are at their maximum during periods of cutting (i.e., removal of coke from the coke drum using high pressure water sprays),[5] which in turn informed the period when subsequent CCSEM EDS of filters associated with the subsequent air monitoring should be conducted.

3. **Upwind/Downwind Air Samples** – Air samples collected at the six e-samplers during the study period. This step resulted in the upwind/downwind analysis of PM_{10} concentrations during each 24-hour period, analysis of PM_{10} concentrations during periods of coke cutting, and subsequent CCSEM EDS fingerprint analysis of filters. Filters were collected and analyzed for eleven coke cutting events that occurred during the sampling period.

A technical report that provides a detailed description of the monitoring methodology, analytical procedures, and resultant findings has been prepared by Clean Air and is provided in **Appendix B**. The results of the upwind/downwind monitoring program are also summarized below:

Real-Time Ambient Air Concentration Data Analysis – Average PM_{10} concentrations for the upwind and downwind monitors during the sampling period were 7.2 and 5.8 mg/m^3, respectively.[6] Overall, PM_{10} concentrations decreased an average of 0.0015 mg/m^3 between the upwind and downwind monitors, as shown in **Table 2**.

Table 2 **Real-Time PM_{10} Samples Analysis Results for the Entire Sampling Period**

PM Concentration (µg/m³)			Coke Pit PM Pickup (%)
Upwind (C_{UW})	Downwind (C_{DW})	C_{DW} - C_{UW}	
7.2	5.8	-1.5	-20.1

The results further show that upwind concentrations were measured higher than or equal to downwind concentrations for 65% of the monitoring period. A decrease in measured concentration indicates that the target source located between the upwind and downwind monitors (i.e., the coke processing, handling, off-site trucking operation) either did not contribute to the downwind concentration or contributed only a small fraction of the downwind-monitored concentration. Periods when there was a small increase between the upwind and downwind monitors does not necessarily indicate a contribution from the target source since other sources located between the monitors (e.g., adjacent salt plant, rail operations, or nearby vehicle traffic) and/or brief wind fluctuations could be culpable.

---

[5] Cutting is a process (not storage) step inherent to coker plant operations that cannot be fully enclosed; though an intense water curtain and water filled pit are used to substantially reduce potential particulate emissions associated with the process.

[6] The measured concentration levels are well under the health-protective national ambient air quality standard of 150 $\mu g/m^3$.

Subsequent fingerprinting of target sampling periods provides greater clarity on the potential for the coke processing, handling, and off-site trucking operation to cause an adverse off-site impact.

None of the measured 24-hour upwind or downwind monitored concentrations during the sampling period were above the national ambient air quality standard (NAAQS) for PM_{10} (or even $PM_{2.5}$), which are the health-based standards established by the U.S. EPA under the federal Clean Air Act.

Fingerprinting Analysis to Assess Coke Processing and Handling Contributions – Utilizing CCSEM EDS, laboratory analysis of particulate filters was conducted to assess whether the coke processing, handling, and off-site trucking operation contributes to measured PM_{10} concentrations at downwind ambient monitors. Through analysis of bulk samples from the coke pit, verified with air monitoring at the coke wall, the laboratory was able to identify particle characteristics that are attributable to petroleum coke. These characteristics, namely a rich amount of carbon and sulfur, provides a petroleum coke "fingerprint" that is unique when compared to most other nearby sources.

The overall study period consisted of nine 24-hour sampling periods encompassing 17 periods of active coke processing (i.e., coke cutting events). Analysis of meteorological data collected during the sampling periods indicates that wind flow during four cutting events (Events 2, 6, 8, and 12) was consistent-enough to allow for the clear identification of upwind and downwind monitors. Accordingly, CCSEM EDS particle analysis of the upwind and downwind filters was conducted for those four sampling periods.

The results of the particle analysis, which are presented in detailed in **Appendix B**, shows that filters collected from downwind monitors did not contain a mass percentage of petroleum coke particles higher than the upwind monitors.[7] That is, for any period when an increase in the downwind concentration of PM_{10} occurred, the characteristics of the captured particulate were attributable to emission sources not associated with coke handling activities. Consequently, particle analyses supports a finding that sources other than coke handling operations contribute to measured PM concentrations in the vicinity of the Detroit refinery.

Focused ambient monitoring showed no evidence that either the number or mass of petroleum coke particles increases downwind of the coke processing, handling, or off-site trucking operation. Therefore, the ambient monitoring study demonstrates that the existing emissions control strategy for the coke processing, handling, and off-site trucking

[7] As detailed in Section 5 of Appendix B, minute changes (increases or decreases) in downwind concentration that fall within the range of uncertainty of the individual measurements and local winds were not further analyzed as they provide insufficient evidence of a downwind change.

operation (30-foot high wall, material wetting, enclosures, and fabric filter dust collectors) results in no adverse air quality impact in surrounding communities.

Air Quality Impact Analysis

As a secondary tool beyond measuring actual emissions during the above ambient monitoring study, it is also important to evaluate potential maximum emissions as authorized within the ROP. Atmospheric dispersion modeling analyses of potential PM_{10} and $PM_{2.5}$ emissions associated with coke processing, handling, and off-site trucking operations have been conducted to assess the potential for adverse health impacts in communities located near the Detroit Refinery. The analyses were conducted in accordance with applicable State of Michigan and federal modeling guidance and in a manner consistent with modeling analyses of the Detroit Refinery previously approved by EGLE. The methodology and results of the air quality impact analysis are described below and presented in detail in a technical report submitted as **Appendix C**.

The successful outcome of an air quality impact analysis depends upon the use of an appropriate dispersion model and application of model-required databases that are representative of dispersion conditions within the study area. Databases utilized in the modeling study and resultant model-predicted impacts are summarized below and detailed in the technical report:

Dispersion Model – Simulations were conducted using the AMS/EPA Regulatory Dispersion Model (AERMOD, Release No. 18081). AERMOD is currently recommended and approved for use by the U.S. EPA and EGLE for near-field fugitive emission source modeling applications.

Land Use – The Detroit Refinery and surrounding communities are located in an urban setting. Therefore, the AERMOD simulations were conducted using urban dispersion coefficients.

Building Downwash – Structures have the potential to influence emissions from the three point sources associated with the coke handling operations. The U.S. EPA-approved BPIP-PRIME program (Release No. 04274) was used to assess aerodynamic downwash effects on the modeled emission points.

Receptor Points – AERMOD is designed to predict air quality impacts at discrete receptor locations. Accordingly, a dense grid of receptor points was developed to ensure that air quality impacts would be predicted over potentially-affected populations.

Meteorological Data – Consistent with previous EGLE-approved modeling analyses of the Detroit Refinery, model simulations were conducted using surface observations measured at the Detroit City Airport, combined with coincident upper air observations measured in

White Lake, Michigan. The five-year meteorological database (2014-2018) was obtained in one minute, U* adjusted format from the EGLE website.

Emission Source Parameters – Potential PM_{10} and $PM_{2.5}$ emissions associated with the coke processing, handling, and off-site trucking operations were estimated based on the maximum permit-allowable coke production rate and emission factors published by the U.S. EPA. The emission rates used in the modeling analyses were reviewed and approved by EGLE as part of the Detroit Heavy Oil Upgrade Project (DHOUP) permitting. Low-level fugitive sources (e.g., dewatering pad) were modeled as area sources, while vent sources (e.g., truck loading baghouse) were modeled as point sources.

Health Standard – The U.S. EPA has established national ambient air quality standards (NAAQS) designed to be protective of public health and the environment. An existing facility may not cause an air quality impact that exceeds the NAAQS. The U.S. EPA has also established significant impact levels (SILs) that are much lower than the NAAQS. When conducting dispersion modeling of a new or modified emission source (typically as part of an air permit application), the U.S. EPA has affirmed that model-predicted concentrations lower than a SIL indicates that the source does not have a significant or meaningful impact on air quality and will, therefore, not cause or contribute to an exceedance of the NAAQS.[8] U.S. EPA-established SILs and NAAQS are summarized below in **Table 3**.

Table 3 **Significant Impact Levels and National Ambient Air Quality Standards**

Pollutant	SIL [µg/m³]	NAAQS [µg/m³]	Averaging Period	Statistical Metric for the SIL Over a Three-Year Period
PM_{10}	5	150	24-Hour	Not to be exceeded.
$PM_{2.5}$	1.2	35	24-Hour	98th percentile.
	0.2	12	Annual	Annual mean.

Though the coke processing, handling, and truck loading operations do not constitute a new or modified source, the results of the model simulations conducted as part of this analysis were compared against the more restrictive SILs.

Model-Predicted Impacts – Utilizing AERMOD over the five-year meteorological database (2014-2018 Detroit City/White Lake), model simulations of potential PM_{10} and $PM_{2.5}$ emissions from the coke processing, handling, and truck loading operations were modeled and resultant predicted off-site impacts were compared against the U.S. EPA-established

[8] Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program, U.S. EPA Memorandum to Regional Air Division Directors, April 17, 2018.

SILs and NAAQS. Everywhere in nearby communities where model-predicted impacts are less than a SIL are considered to be insignificant and will not cause an exceedance of the health-based NAAQS.

As shown in **Figure 8** and **Figure 9** below, maximum 24-hour PM_{10} and $PM_{2.5}$ concentrations in each nearby residential community were predicted by AERMOD to be orders of magnitude below the NAAQS and are even well below the more stringent SILs.

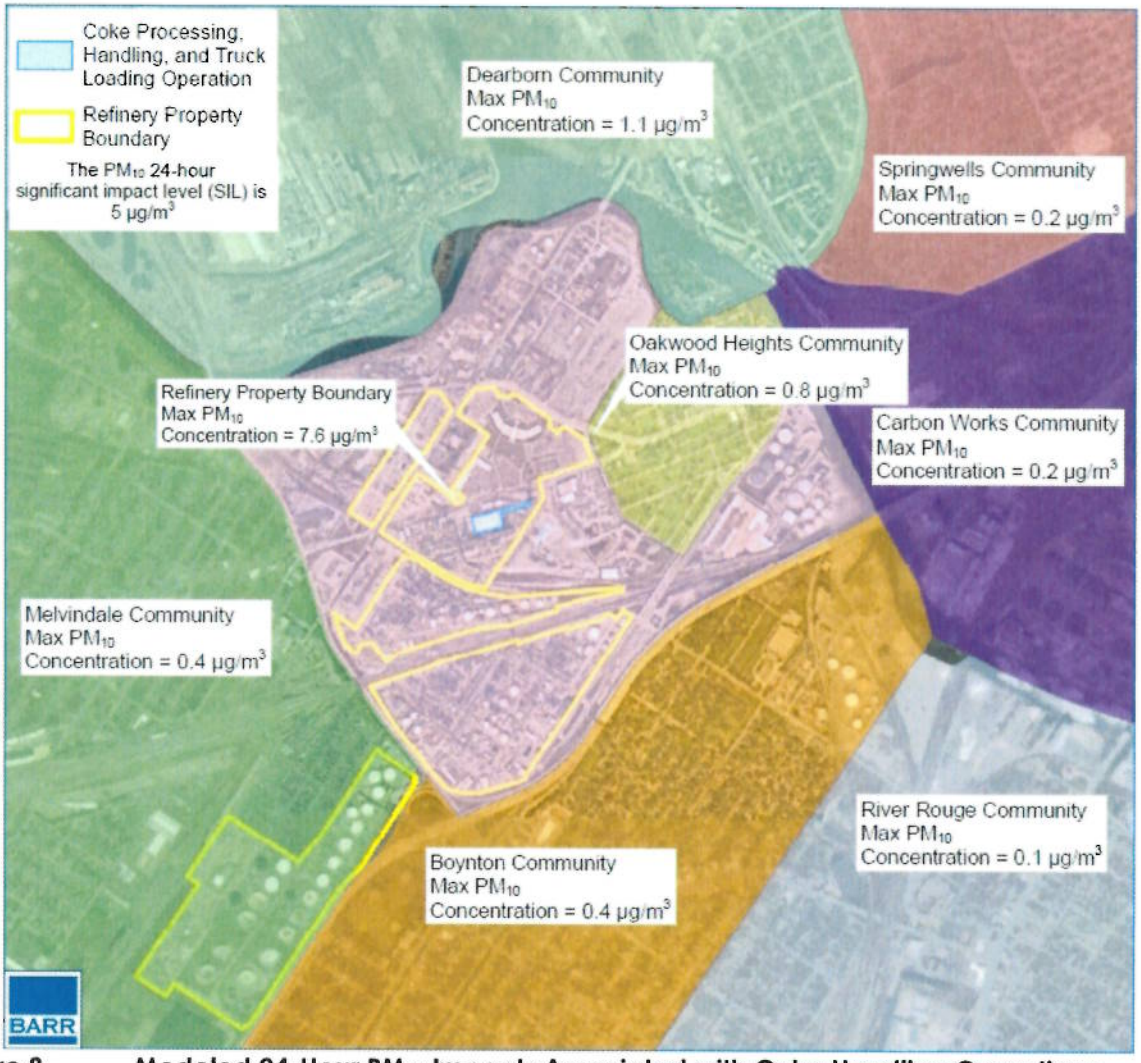

Figure 8 **Modeled 24-Hour PM_{10} Impacts Associated with Coke Handling Operations**

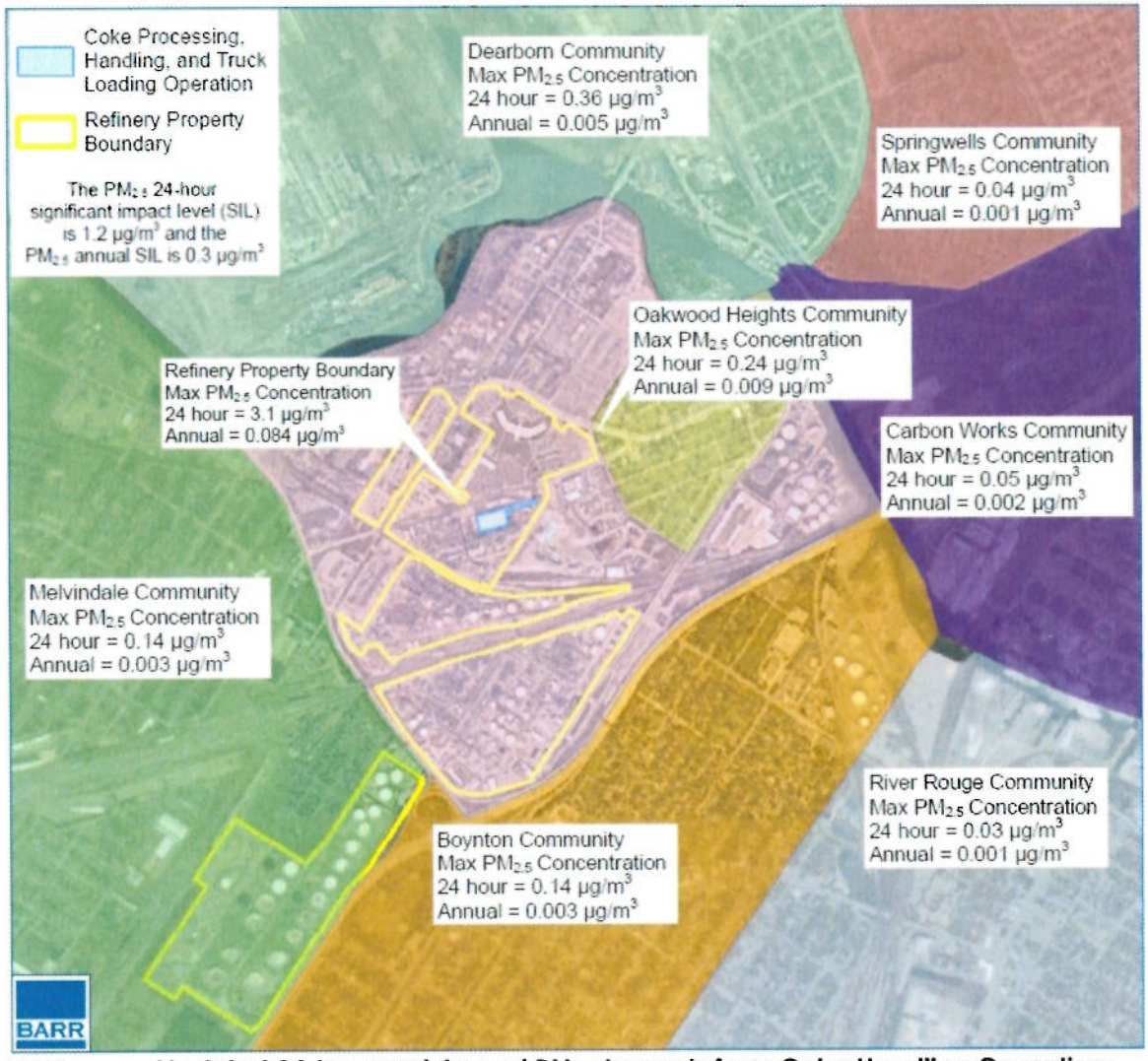

Figure 9 **Modeled 24-hour and Annual $PM_{2.5}$ Impacts from Coke Handling Operations**

Note: The modeling results are likely an over-prediction and are, therefore, conservative for the following reasons:

- Modeled-predicted concentrations are based on potential to emit, which is the theoretical maximum rate that each modeled source can emit concurrently. To date, this level of emissions has never occurred, as verified through actual emission reports submitted annually to EGLE through its air emission reporting program (MAERS). Modeling of actual emissions from the coke processing, handling, and truck loading operations would result in even lower impacts.

- The modeling represents the contribution of all emission sources associated with the coke processing, handling, and truck loading operations. The contribution of the coke pit and dewatering pad – the only portion of the operation for which a partial variance is requested – is only a fraction of the total contribution, and is less than the SILs over all off-site receptors.

Based on established health-based ambient air thresholds, the modeling analyses demonstrate that the coke processing, handling, and truck loading operations, as currently permitting and controlled, do not pose a health risk to nearby communities.

Analysis of Community and Refinery Perimeter Monitoring

The ROP requires MPC to conduct an enhanced perimeter air monitoring program at the Detroit Refinery. The resultant Perimeter Air Monitoring System (PAMS) program was initiated in 2012 after review and approval of the proposed monitoring equipment, monitoring methodology, and quality assurance procedures by EGLE. The PAMS network consists of four monitors that have been strategically located to measure ambient PM_{10} and other regulated pollutant concentrations from operations at the Detroit Refinery (including the coke processing, handling, and truck loading operations) and other nearby facilities. The PAMS are maintained by a 3rd party contractor. The EGLE-approved location of the ambient monitors is shown in **Figure 10**.

Figure 10 **Parametric Ambient Monitoring Station Locations**

The U.S. EPA has established NAAQS designed to be protective of public health and the environment. An existing facility may not cause an air quality impact that exceeds the NAAQS. Consistent with the statistical form of the NAAQS, the highest, fourth-highest 24-hour PM_{10} concentrations measured at the four PAMS monitors for the most recent three-year period are summarized in **Table 4**.[9]

Table 4 **Real-Time PM_{10} Samples Analysis Results for the Entire Sampling Period**

Ambient Monitor	Measured Concentration ($\mu g/m^3$)	PM10 NAAQS ($\mu g/m^3$)
Site 1 North	80	150
Site 2A West	129	
Site 4 East	72	
Mark Twain School	47	

As shown in the table, there were no measured exceedances of the PM_{10} NAAQS. Therefore, the PAMS network demonstrates that the coke processing, handling, and truck loading operations (in conjunction with other operations at the Detroit Refinery and nearby facilities) do not cause an exceedance of the U.S. EPA-established PM_{10} NAAQS.

Material Moisture Content Evaluation

Control of particulate emissions from material handling operations can be accomplished through the implementation of preventative measures that limit the potential for the emissions to occur, or through the capture and removal of the emissions once they occur. Moisture serves as an important preventative measure when handling materials such as petroleum coke because it causes fine particles (which are lighter and more apt to become airborne when handled or subjected to wind) to stick to larger, heavier particles that require more energy (e.g., higher wind) to become airborne. Material moisture content is recognized by the U.S. EPA and EGLE to be a key limiter of emissions potential.[10]

Once petroleum coke is discharged from the drum to the pit, it is submerged in water and allowed to cool. This is accomplished by controlling the amount of time the coke is allowed to be staged on the pad and ensuring that the wall-mounted sprinkling system is operating, as needed to maintain coke moisture content. This is a key preventative measure in the

[9] Compliance with the 24-hour PM_{10} NAAQS is demonstrated when the high, fourth highest measured concentration across a 3-year period is less than 150 $\mu g/m^3$. The 3-year period extends from Oct. 2016 through Sept. 2019.

[10] Aggregate Handling and Storage Piles, Section 13.2.4, Compilation of Air Pollutant Emission Factors (AP-42), Fifth Edition, U.S. EPA.

comprehensive emissions control strategy that makes the Detroit Refinery coke handling operation state of the art for petroleum coke handling at a delayed coker unit.

Photographs showing the control measures that are employed during the movement of petroleum coke from the drum to the enclosed conveying system (water curtain, water filled pit, and 30-foot high walls) are provided below. The high pressure water sprays that saturate the petroleum coke as it exits the coke drum are shown in **Figure 11**. The flooded coke pit is shown in **Figure 12**. The transfer of petroleum coke from the pit to the dewatering pad via overhead crane is shown in **Figure 13**.

Figure 11 Water Sprays Controlling Transfer of Coke from the Oven to the Pit

Figure 12 Transfer of Coke from the Pit to the Dewatering Pad

Figure 13 Staging of Wet Coke Prior to Transfer to the Enclosed Conveying System

To ensure the effectiveness of the preventative measures, an MPC contractor takes coke samples from the pit three times per week and analyzes the samples for moisture content.

Visible Emissions Monitoring

Pursuant to Condition I.1, EU70-COKER-S1 of the ROP, visible emissions from the coke conveying system, crusher, weigh bins, and truck loading operation may not occur.[11] Further, Condition VI.2, EU70-COKER-S1 states, *"The permittee shall verify the absence of visible emissions by taking six-minute visible emission readings for the equipment listed in SC I.1 a minimum of once per calendar day."* Condition VI.6 requires MPC to maintain records of the visible emissions monitoring, including the data, time, name of observer, and the status of visible emissions.

MPC has been complying with the daily visible emissions observation requirement since the commencement of operation of the Coker Unit in 2012. To date, there has never been a measured visible particulate emission from the coke conveying system, crusher, weigh bins, and truck loading operation. Therefore, effective control of the coke conveying system, crusher, weigh bins, and truck loading operation has been demonstrated.

[11] Based upon a six minute average time period.

A copy of all records dating back to 2013 are being provided in electronic format (USB Drive) in **Appendix D**.

Pursuant to Section 22-5-16(a) of the Ordinance, *"An owner or operation of a facility subject to this article shall not cause or allow any fugitive dust from any road, lot, or storage pile, including any material handling activity at a storage pile, that has an opacity greater than 5%."* Further, Section 22-5-16(b) states *"An owner or operator of a facility subject to this article shall not cause or allow any fugitive dust beyond the property line of the facility that has an opacity greater than 0%."* Compliance with the opacity limits is to be determined, on at least a quarterly basis, through visible emissions testing in accordance with U.S. EPA Reference Method 9d (Section 22-5-16(c) and (d)).

To supplement the visible emissions testing already being conducted, on a daily basis, in accordance with the ROP, MPC has implemented a quarterly Method 9d visible emissions testing program, as required by the Ordinance.

E. A statement explaining:

(1) Why compliance with the regulations imposes an arbitrary or unreasonable hardship; or

The requirement to install a roof over the existing 30' high walled coke pit and dewatering pad imposes arbitrary or unreasonable hardship due to technical infeasibility & unsafe working conditions that would be introduced:

Technical infeasibility – The addition of a roof on top of the 4 existing enclosure walls is not technically feasible. The existing walls and civil foundations were not designed to withstand the weight of an added roof structure. There are no fully enclosed coke pit systems installed on a delayed coker unit within the petroleum refining industry. The Detroit Refinery's predominantly enclosed system along with the air emissions mitigations have established the most effective emissions control strategy in the industry.

Worker Safety – There are numerous safety concerns associated with the processing of high temperature coke in a pit equipped with a roof, such as limited visibility from steam, excessive heat, and confined space conditions. The addition of conveyors and/or front-end loaders necessary to replace the overhead crane system would impose a safety risk for workers now having to complete their tasks in a confined space.

(2) Why compliance cannot be accomplished during the required timeframe due to events beyond the facility owner or operator's control such as permitting delays or natural disasters; or

Not applicable.

(3) Why the proposed alternative measure is superior or preferable.

Notwithstanding the safety and feasibility limitations described above, the petroleum coke handling operation, which has been in operation since 2012, is regulated and already controlled to a level that meets the fugitive emission reduction objectives of the Ordinance. The petroleum coke handling operation is covered under a comprehensive Fugitive Dust Control Plan. Further:

- Visible emissions monitoring of the existing operation demonstrate that the petroleum coke processing, handling, and off-site trucking operation is already in compliance with the emission limits specified in the Ordinance and the Detroit Refinery ROP.
- The petroleum coke goes through an intense water curtain into a pit full of water where it is submerged prior to staging on the adjacent pad. This area has impermeable floors surrounded on all sides by 30-foot walls, which serve as an effective wind barrier.
- The ROP requires the height of any petroleum coke staged or processed in the pit to be below the height of the perimeter walls.
- The coke handling system is a very wet process. The moisture content of any staged petroleum coke must be maintained at a level sufficient to limit its emission potential. High volume sprinkler systems are used when needed to maintain moisture content.
- The coke handling systems, from the coke feed conveyor hopper through to the truck load out, are completely enclosed. All enclosed areas have high efficiency air filtration systems and water wash systems to control and prevent dust formation.
- The truck load-out building has a local vacuum exhaust ventilation system and high efficiency air filtration. Truck tires are cleaned by a water wash system to prevent track-out, and the trucks pass over Ordinance-required rumble strips.

The coke processing and handling system is already regulated and well controlled. Based on the technical analyses presented in this submittal, the installation of a roof over the coke pit retaining walls would provide no discernable additional reduction in emissions.

A leading expert in the operation of Coker Units has visually inspected the Detroit Refinery coke pit/dewatering pad and has stated that *"the existing emissions control system exceed industry norms"*. Further, *"adding the cover to the pit would create additional hazards to operation and would not materially reduce the dust emissions"*. A copy of correspondence from the expert, Coking.com, is enclosed in **Appendix E**. [12]

[12] Letter to the Detroit Buildings, Safety, Environmental and Engineering Department, Coking.com, July 2, 2019.

F. A description of the proposed methods to achieve compliance with the regulations and a timetable for achieving that compliance, if applicable;

Not applicable.

G. A discussion of the alternate methods of compliance and of the factors influencing the choice of applying for a variance;

Section *22-5-40 Enclosure of Carbonaceous Bulk Solid Materials* is intended to reduce fugitive particulate matter emissions from carbonaceous material storage, handling, and trucking operations. Based on a robust fugitive dust control program, including controls specific to the processing, handling, and transport of petroleum coke, particulate matter emissions from these operations are minimal. Installation of a roof on the existing enclosure would not result in a substantive reduction in emissions from this operation.

MPC's coke handling operation is unique in the City of Detroit's Ordinance jurisdiction because it is the only facility that is part of an operating Coker Unit at a petroleum refinery. MPC does not store petroleum coke in open piles that are exposed to the elements. The coke pit is enclosed on all sides and is designed to be operated with the top exposed to accommodate an overhead bridge crane to handle coke within the coke pit. The ROP, which allows no visible emissions from the processing, handling, and off-site trucking operation, requires the use of the bridge crane rather than front-end loaders or other vehicles to handle coke, and limits the use of front-end loaders or other vehicles to periods when the bridge crane breaks down or requires maintenance. Though the top side of the coke pit is not enclosed, the water spray system on the coke pit walls is used to maintain moisture in the coke to prevent dust from escaping the coke pit. Coke exiting the two Coke Drums is wet, and enters the wall enclosure near the bottom through a water curtain. The overhead bridge crane system is used to move coke within the coke pit to the fully enclosed conveyor system that is equipped with bag house filter systems at transfer points and water spray hoses/nozzles if needed.

MPC maintains a Fugitive Dust Control Plan that includes steps taken to minimize particulate emissions from coke handling. These steps include the following:

a) The primary method of dust control is maintaining an adequate moisture level in the coke. This is accomplished by controlling the amount of time coke is allowed to be staged on the pad and ensuring water spray systems are operating when needed.
b) Coke is sampled three times per week and analyzed for moisture content. The average coke moisture content is maintained at a level (approximately 10% by weight) sufficient to reduce the potential for airborne emissions.
c) Petroleum coke moisture levels in the coke pit can be increased through the use of the existing wall-mounted sprinkler system.
d) Coke handling operators conduct visual observations of the process and make adjustments as needed to minimize particulate emissions. These daily activities are documented on a daily log sheet, as shown in **Appendix D**.

MPC's coke pit operation is enclosed on five sides (with an impermeable concrete floor and four 30-foot concrete walls), is staffed continuously, and is wetted as part of routine operations. Existing Best Management Practices included in the refinery's FDC Plan are intended to ensure consistent and optimal operation of the coke handling system.

The factors described above in this section justify the request for a variance from the requirement to install a complete enclosure over the existing coke pit. For the requirement from which MPC requests a variance, existing control and/or monitoring measures provide an equivalent level of emissions control. Moreover, technical analyses provided in this submittal demonstrate that the existing operation does not have the potential to cause an adverse air quality impact in nearby communities.

H. A statement regarding the person's current status as related to the subject matter of the variance request;

The petroleum coke processing, handling, and off-site trucking operation, which has been in operation since 2012, is in compliance with its air permit, applicable federal and Michigan air rules, and, with the two exceptions noted in this variance request, the Ordinance. As demonstrated in this submittal, the approval of a variance from installing a roof over the coke pit does not pose a nuisance or health risk to nearby communities. MPC will continue to operate state of the art air emissions controls technology in order to ensure the lowest achievable emissions of particulate matter from its petroleum coke handling operation. These controls are considered the best in the refining industry for petroleum coke handling at a delayed coker unit.