Permit to Install Application
Detroit Permitting Project

Prepared for
Marathon Petroleum Company LP
Michigan Refining Division

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Contents

List of Tables

List of Figures

List of Attachments

Nomenclature

%, v	Percent by volume
%, w	Percent by weight
A2PA	Actual-to-projected-actual
Airshed	An airshed is the geographic area responsible for emitting a significant percentage of the air pollution reaching a body of water. Since different pollutants behave differently in the atmosphere, the airshed of a given body of water may vary depending on the pollutant of interest. While watersheds are actual physical features of the landscape, airsheds are determined using mathematical models of atmospheric deposition. www.epa.gov/owow/oceans/airdep/air5.html
AP-42	"Compilation of Air Pollutant Emission Factors – Volume I: Stationary Point and Area Sources," AP-42, United States Environmental Protection Agency, 1995
BACT	Best available control technology
Btu	British thermal unit
CAA	Clean Air Act
Class II Area	Areas of the country protected under the Clean Air Act but identified for somewhat less stringent protection from air pollution damage than a Class I area, except in specified cases.
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalents
Criteria Pollutants	Ozone, Particulate Matter, Carbon Monoxide, Lead, Sulfur Dioxide and Nitrogen Dioxide
°F	Degrees Fahrenheit
°C	Degrees Centigrade or Celsius
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EPA, or US EPA	United States Environmental Protection Agency
gal	Gallon
GHG	Greenhouse Gas
GWP	Global Warming Potential
HAP	Hazardous air pollutant listed in or pursuant to section 112(b) of the Clean Air Act.
IRSL	Initial Risk Screening Level

ITSL	Initial Threshold Screening Level
lb/hr	Pounds per hour
MACT	Maximum Achievable Control Technology
MMBtu	Million British thermal units (1,000,000 Btus)
MMBtu/hr	Millions of British thermal units per hour
MMSCF	Million standard cubic feet
NAAQS	National ambient air quality standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_X	Nitrogen oxides – including all of the oxides of nitrogen
NSPS	New Source Performance Standards (cited at 40 CFR 60)
NSR	New Source Review (cited at 40 CFR 52.21)
O_3	Ozone
Pb	Lead
Point Sources	Emission sources that emit from a defined location, such as a stack or a vent
PM	Particulate matter
PM_{10}	Fine particulate matter (fine particulate matter, defined as particulate matter less than 10 microns in aerodynamic diameter)
$PM_{2.5}$	Fine particulate matter (fine particulate matter, defined as particulate matter less than 2.5 microns in aerodynamic diameter)
pph	Pounds per hour
ppm	Parts per million
PSD	Prevention of Significant Deterioration
PTE	Potential-to-emit
PTI	Permit To Install
ROP	Renewable Operating Permit
SAM	Sulfuric Acid Mist
scf	Standard cubic foot
SO_2	Sulfur dioxide
TAC	Toxic air contaminant
ton	Short ton = 2,000 pounds
TPY	Tons per year
TRS	Total Reduced Sulfur
VOC	Volatile Organic Compounds

1 Executive Summary

This Technical Support Document presents technical and regulatory information to support an Air Use Permit to Install (PTI) application submitted by the Michigan Refining Division of Marathon Petroleum Company LP (MPC) for the Detroit Permitting Project to meet fuels production demand and limit emissions at its petroleum refinery in Detroit, Wayne County, Michigan.

This project includes the removal or adjustment of certain product throughput/tank storage limits from the refinery's air permit[1] to allow the refinery to operate at the daily capacity supported by existing equipment. No physical changes will be made to existing equipment, and no new equipment will be installed as part of this project other than the voluntary emission reduction initiatives shown below. MPC intends to accept limits that restrict pollutant emissions to levels significantly lower than currently allowable.

Changes requested as part of this application include the following:

- Removal of throughput limits contained in FGCRUDETANKS-S1 flexible group conditions,
- Removal of throughput limits contained in FGNAPHTHATANKS-S1 flexible group conditions,
- Removal of throughput limits contained in FGGROUP2-S1 flexible group conditions,
- Adjustment of the coke drum cycling limit in EU70-COKER-S1 emission unit conditions from 487 cycles per 12-month rolling time period to 500 cycles per 12-month rolling time period,
- Inclusion of language from US EPA Consent Decree 12-11544
- Extension of perimeter air monitoring program at the facility for three years after issuance of the requested PTI.
- Incorporation of PTI 52-70 and parts of PTI 118-50 corresponding to sections of the ROP with requested updates

As an additional measure to compensate for any potential criteria pollutant emission increases, MPC is committing to the following voluntary emission reduction initiatives:

1. Replacing the Naphtha Hydrotreater (NHT) heaters with two, new, state-of-the-art lower NOx emitting heaters.
2. Removing the Crude Flare from service by re-routing streams that are normally routed to the Crude Flare to the Coker Flare System. Note that the Coker Flare is equipped with a gas recovery system designed to limit flaring and lower emissions. The Crude Flare does not have a gas recovery system.
3. Installing a geodesic dome designed to lower volatile organic compound (VOC), hazardous air pollutant (HAP), and toxic air contaminant (TAC) emissions on an existing finished gasoline storage tank.

[1] Renewable Operating Permit No. MI-ROP-A9831-2012c, issued by the Michigan Department of Environment, Great Lakes, and Energy, Air Quality Division on March 26, 2012, last revised on September 12, 2016.

4. Expanding the refinery's leak detection and repair (LDAR) program to include the monitoring of additional components in the refinery.

The Detroit Permitting Project will comply with all applicable Wayne County, State of Michigan, and federal air pollution requirements including federal New Source Performance Standards (NSPS), federal National Emission Standards for Hazardous Air Pollutants (NESHAPs), Michigan's Air Toxics Rules, and Michigan's rules for the control of VOCs. Air quality modeling demonstrates that the Detroit Permitting Project will comply with Michigan TAC health-based screening levels and federal national ambient air quality standards (NAAQS). The project will be classified as a minor modification under Michigan's Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NNSR) rules.

The Detroit Permitting Project constitutes a change in the method of operation of the Detroit Refinery. Therefore, pursuant to R 336.1201 of Michigan's Administrative Rules for Air Pollution Control (PA 451 of 1994, as amended), MPC must apply for and obtain a PTI that allows for the proposed change. This Technical Support Document fulfills the application submittal requirements of R 336.1203 (Information Required). A further description of the Detroit Permitting Project, including the methodology for estimating emissions associated with the project, is provided in **Section 2**. New Source Review (NSR) applicability is evaluated in **Section 3**. The applicability of federal and Michigan air regulations to the project is evaluated in **Section 4**. Air quality impact analyses demonstrating compliance with the NAAQS, as well as health-based screening levels published under Michigan's Air Toxics rules, is provided in **Section 5**.

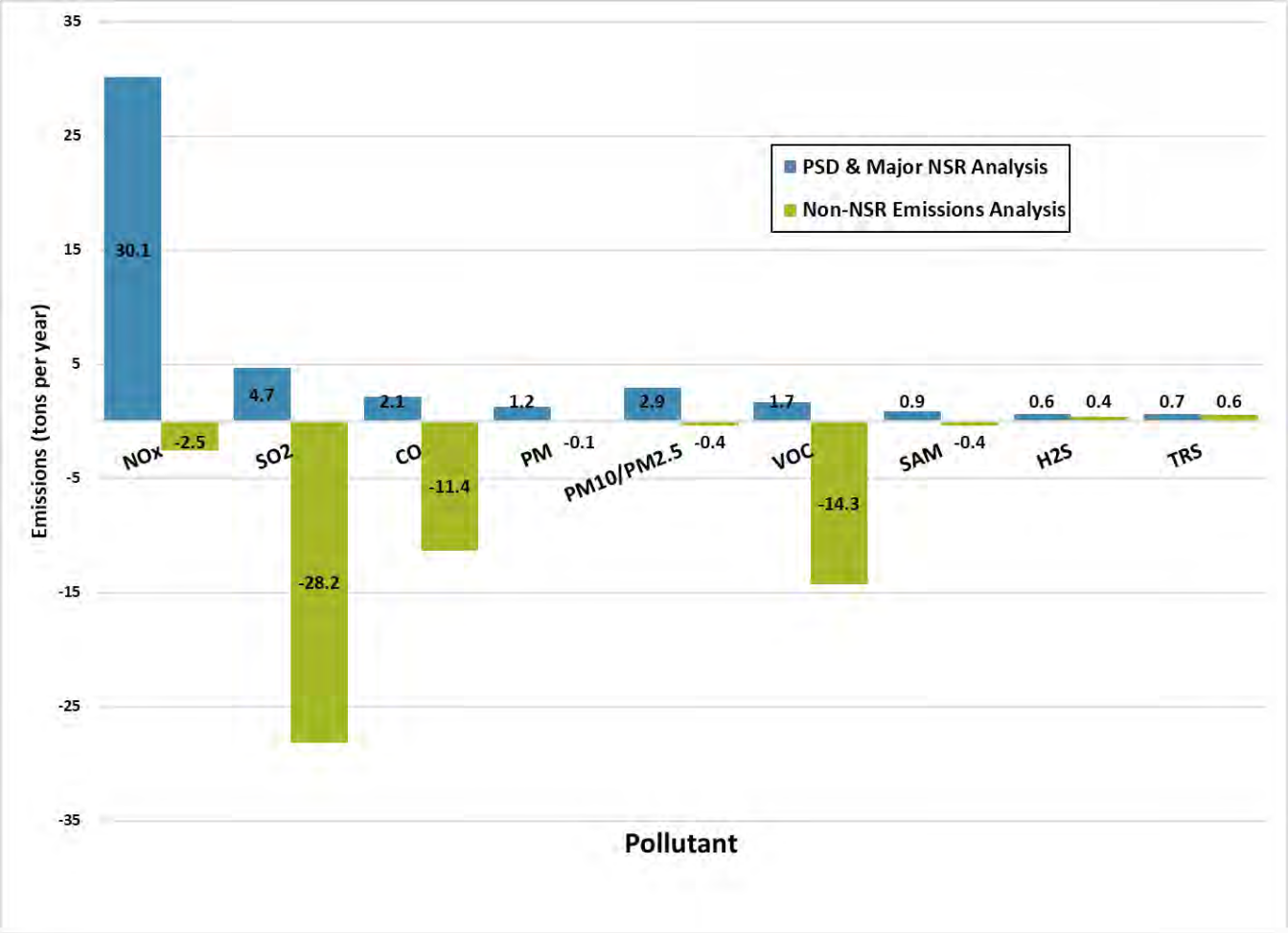
The PTI application form, signed by the Responsible Official, is provided in **Attachment A**.

1.1 Emissions Summary

The goal of the Detroit Permitting Project is to operate the Detroit Refinery in a manner supported by existing equipment without causing an increase in emissions above historical limits. MPC proposes to accomplish this goal by requesting a limit (or cap) on individual pollutant emissions from the equipment affected by the project. In addition, MPC is committing to the pollution control projects described above. The outcome of this effort, which is illustrated by the green bars on Figure 1-1, is a net reduction in pollutant emissions when compared against an actual 12-month period of emissions that occurred at the Detroit Refinery over the recent past and that are allowed under the current permit.

This is a more accurate representation of the project goals than what is shown when calculating the emissions change following the calculation methodology of the NSR rules. For comparison purposes, the emissions change calculated under the NSR rules is represented by the blue bars on Figure 1-1. Note that the blue bars do not show the positive effects of the proposed emissions caps and emissions control projects.

Figure 1-1 Net Emissions Impact with Projected Emissions and Voluntary Projects (tpy)



2 Project Description

2.1 General Facility Information

The Detroit Refinery is located at 1001 South Oakwood Boulevard, Detroit, MI 48217 and operates under State Registration Number (SRN) A9831. The refinery utilizes various hydrocarbon processing units to produce important consumer and commercial products including gasoline, fuel oils, asphalt, propane, and propylene. Finished products are transferred to customers via truck, rail, and barge loading racks as well as pipeline.

The refinery is currently classified as a major stationary source under R 336.1211(1)(a) for Title III and V of the federal Clean Air Act, R 336.2801(cc)(i)(K) for PSD, and R 336.2901(u) for NNSR. The refinery operates under Renewable Operating Permit (ROP) No. MI-ROP-A9831-2012c (the ROP) and PTI No. 113-22, which covers the recently permitted sulfur recovery unit (SRU) emissions reduction project. An administratively complete ROP renewal application was submitted to the Michigan Department of Environment, Great Lakes, and Energy, Air Quality Division (AQD) on February 13, 2017.

The refinery is in an area currently designated nonattainment for sulfur dioxide (SO_2). However, based on current monitoring data and proposed actions by the US EPA[2] and AQD[3], it is possible that the area will be redesignated to attainment prior to the issuance of a PTI covering the Detroit Permitting Project. Further, modeling conducted by the US EPA in support of their Federal Implementation Plan (FIP) demonstrated that emission reductions at the Detroit Refinery were not necessary to bring the area back into attainment with the SO_2 NAAQS.

On May 19, 2023, the US EPA redesignated Wayne County to attainment/maintenance for ozone.

The location of the Detroit Refinery and surrounding area is shown below. A detailed refinery plot plan is provided in **Attachment K**.

[2] Approval and Promulgation of Air Quality Implementation Plans; Michigan; Federal Implementation Plan for the Detroit Sulfur Dioxide Nonattainment Area (Effective November 12, 2022), US EPA, October 12, 2022.

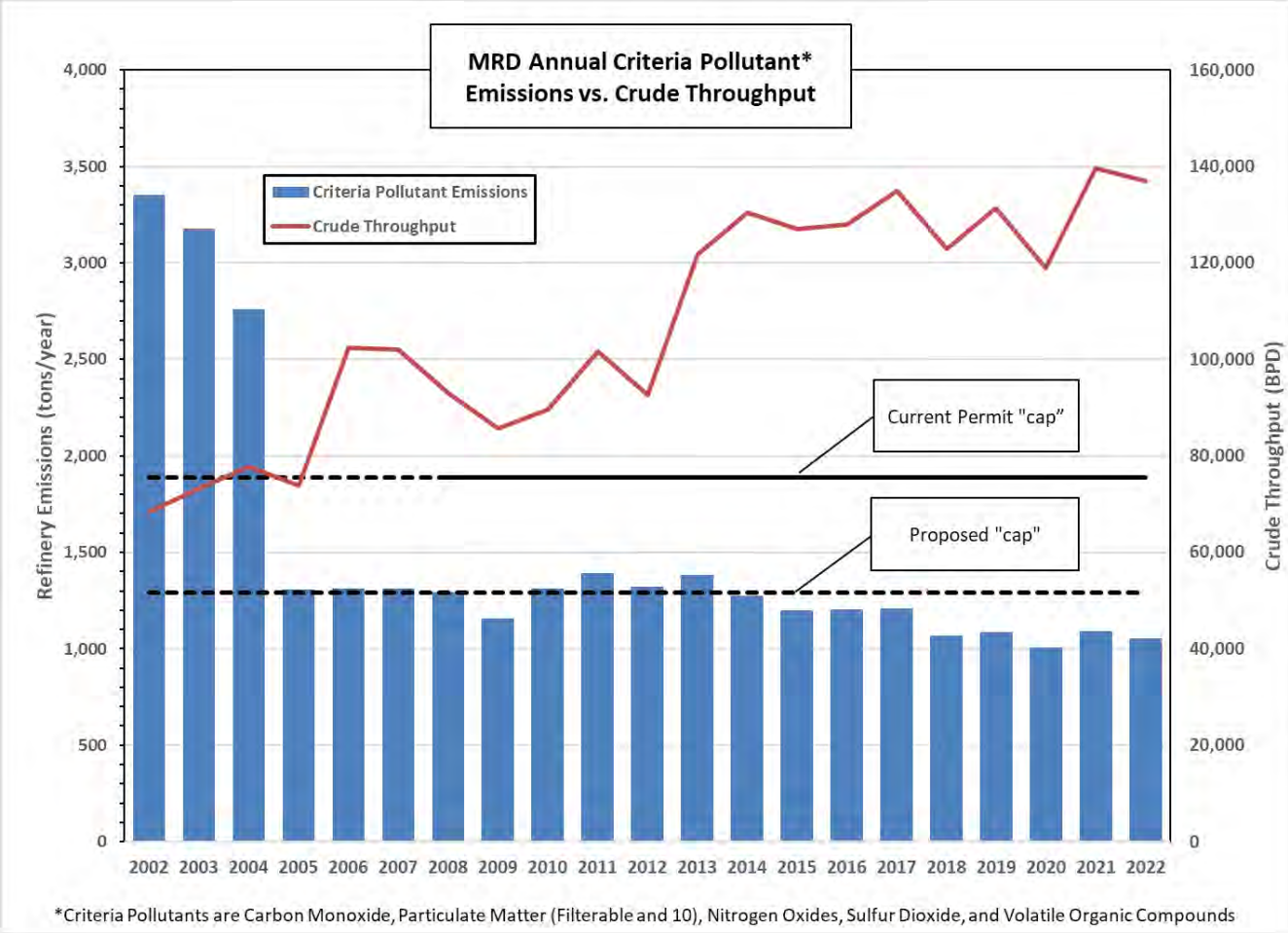
[3] Sulfur Dioxide One-Hour National Ambient Air Quality Standard Nonattainment State Implementation Plan for Wayne County (partial), Michigan Department of Environment, Great Lakes, and Energy, December 2022.

Figure 2-1 Detroit Refinery and Surrounding Area

2.1.1 Operating and Emissions Trends

Since 2002, The Detroit Refinery has reduced emissions by approximately 70% while nearly doubling production. Over the years, the site has invested significantly in pollution control projects (e.g., Flare Gas Recovery and SRU pit sweep gas recycle) as well as identified ways to operate more reliably (minimizing upsets and unplanned shutdowns) and efficiently. For example, in 2021 the site achieved U.S. EPA's Energy Star certification which recognizes the top 25% of similar refineries nationwide based on energy usage and GHG emissions. By operating more reliably and efficiently, the Detroit Refinery has been able to achieve two of the lowest combined annual emissions over the past 20 years while operating at its highest crude throughput rates (2021 and 2022), as shown in Figure 2-2.

Figure 2-2 Comparison of Operations to Emissions[4]



[4] The proposed Detroit Permitting Project cap is adjusted upward to include FG-DHOUPANNUAL emission units that are not affected by the project.

2.2 Detroit Permitting Project

MPC proposes to remove or modify certain throughput limits from its ROP to allow the refinery to operate at the daily capacity supported by existing equipment. Physical changes to the Detroit Refinery are neither necessary nor proposed to accommodate the proposed permit change.

To compensate for potential criteria pollutant emissions increases associated with this project, MPC is proposing limits that restrict criteria pollutant emissions to levels significantly lower than currently allowable (see "proposed cap" in Figure 2-2).

2.2.1 Emissions Units That Could Be Affected by the Project

MPC is not physically changing any process units or emission sources at the refinery as part of this permitting effort. However, several existing units are projected to experience increased annual utilization when current throughput limits are removed. Project affected units are summarized in Table 2-1.

Table 2-1 Emission Units That Could Be Affected by the Project

	Emissions Unit Description	ROP ID
Emissions Units That Could Be Affected by the Project	4H1: Vacuum Heater	EU04-VACHTR-S1
	4H2: Vacuum Helper Heater	EU04-VAC2HTR-S1
	5H1: Crude Charge Heater	EU05-CRUDEHTR-S1
	8H1: GOHT Charge Heater	EU08-GOHTCHARHTR-S1
	8H2: GOHT Charge Heater #2	EU08-GOHTCHARHTR2-S1
	9H7: Alky Heater	EU09-ALKYDIBREBHTR-S1
	77H1: DHT Heater	EU77-DHTHTR-S1
	11H1: FCCU Charge Heater	EU11-FCCUCHARHTR-S1
	FCCU Regenerator Vent	EU11-FCCU-S1
	Disulfide Offgas Combustion	EU21-S2OFFGAS-S1
	16H3: NHT Reboiler Heater	EU16-NHTSTRIPREBOIL-S1
	16H4: NHT Charge Heater	EU16-NHTCHARHTR-S1
	14H1: CCR Platformer Interheater	EU14-CCRPLINTHTR-S1
	14H8: CCR Platformer Charge Heater	EU14-CCRPLCHARHTR-S1
	19H2: KHT Heater	EU19-KHTCHARHTR-S1
	Zurn Boiler	EU27-ZURNBOILER-S1
	B&W Boiler	EU27-B&WBOILER-S1
	Coker Drum Vent	EU70-COKER-S1
	Coke Handling and Haul Roads	EU70-COKER-S1
	70H1: Coker Charge Heater	EU70-COKERHTR-S1
	SRU Complex	EU42-43SULRECOV-S1 EU72-SULRBLOCK2-S1
	Sulfur Rail Car Loading	SOURCE-WIDE CONDITIONS
	H2 Hydrogen Plant Heater	EU71-H2HTR-S3
	Storage Tanks	Various

2.2.2 Pollution Control Projects

MPC is committing to multiple emission reduction initiatives to prevent potential criteria pollutant emissions increases above historical levels due to the project. The emission reduction initiatives described below are voluntary as they are not necessary to demonstrate that the Detroit Permitting Project will comply with applicable air requirements.

2.2.2.1 Replacement of NHT Heaters

MPC proposes to replace two existing heaters – NHT Stripper Reboiler (EU16-NHTSTRIPREBOIL-S1) and NHT Charge Heater (EU16-NHTCHARHTR-S1) – with new heaters equipped with ultra-low NOx burners (ULNB). The existing heaters are equipped with standard burners so the new ULNB will allow the heaters to achieve a significant NOx reduction compared to existing operations. With the exception of CO, MPC

expects emissions of all other pollutants from these heaters to remain unchanged. There may be a small incremental increase of CO pending ULNB vendor guarantees.

The new heaters will be designed with the same firing rates as the existing heaters. The new heaters are functionally equivalent, and the new heaters do not debottleneck or allow for increased utilization of the NHT unit.

2.2.2.2 Crude Flare Re-route

The refinery will remove the Crude Flare (EU-CRUDEFLARE-S1) from service by re-routing streams that are normally routed to the Crude Flare to the Coker Flare System. Note that the Coker Flare is equipped with a gas recovery system designed to limit flaring and lower emissions and has sufficient capacity to accommodate flows from the Crude Flare. This will result in an emissions reduction for several pollutants because the Crude Flare does not have a gas recovery system.

2.2.2.3 Geodesic Dome on Finished Gasoline Tank

MPC will install a geodesic dome on a finished gasoline tank, which is currently controlled by an external floating roof (EFR) to minimize VOC emissions.

2.2.2.4 Enhanced Leak Detection and Repair

MPC will expand the refinery's leak detection and repair (LDAR) program to include the monitoring of at least 3,000 additional components in the refinery that are currently not required to be monitored. This will result in a reduction of actual VOC emissions due to more accurate emission factor information and timely repairs when components are found to be leaking. This emission reduction initiative will commence upon permit issuance.

2.2.3 Facility Emissions After the Project

The existing emissions units have the potential to emit NSR pollutants (including greenhouse gases), HAPs and Michigan toxic air contaminants (TACs). MPC determined projected future operating rates for each project affected emissions unit (Refer to Section 2.2.1). MPC determined applicable emission factors using a combination of continuous emissions monitors (CEMS), performance test data, and default emission factors such as AP-42 where applicable. Refer to Attachment C for details. Section 3 describes the methodology followed to estimate projected actual emissions in accordance with applicable PSD and NNSR requirements.

MPC is proposing enforceable emission limits at levels significantly lower than currently allowable. MPC is requesting that the throughput limits be removed immediately upon permit issuance. MPC intends to achieve all emission reductions associated with voluntary projects included in this permitting effort by the end of calendar year 2025.

MPC calculated emission reductions from the projects described in Section 2.2.2 by comparing future projected emissions to the baseline actual emissions (refer to Section 3.2.1) of associated emission units. The only exception is the enhanced LDAR emission reduction calculation, which is a comparison of actual

2021 emissions to 2021 emission with enhanced monitoring. By virtue of LDAR calculation methodology, the same baseline actual emission calculation methodology cannot be readily applied to emissions from connectors. Calculations can be found in **Attachment C**.

2.2.4 Practical Enforceability and Proposed Permit Conditions

MPC proposes to accept enforceable emission caps, equivalent to or within 5% of the sum of the projected actual emissions for all project affected emission units. Refer to Table 2-1 for a summary of projected affected units. There is no regulatory driver for the proposed emission caps, but MPC is voluntarily proposing enforceable limits to clearly demonstrate that emissions will not exceed projections included with this permit application. Note that these limits are not necessary to avoid the PSD/NNSR rules or to make the proposed PTI enforceable as a practical matter.[5] Proposed caps are summarized in Table 2-2.

Table 2-2 12-Month Rolling Emission Caps for Combined Project Affected Units Upon Permit Issuance (tpy)

Emission ID	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	VOC
Proposed Emissions Caps	424.4	168.4	187.6	111.1	111.1	153.0

Regarding the proposed emission caps:

- The VOC cap includes tank emissions associated from standing and working losses due to routine operation at maximum production rates supported by existing refinery equipment. This rationale (upstream/downstream production capacity as a basis for Tank VOC PTE) provides the method for compliance with Rule 336.1205(1)(a)(i)[6]. The VOC cap excludes landing, cleaning, emptying, or degassing emissions from storage tanks. This is because the project does not impact storage tank maintenance, service inspection, or removal from service schedules.

The proposed emission caps will appear in the requested PTI as a new flexible group, tentatively identified as FGDPPANNUAL. Because the flexible group includes emission units under the operational control of MPC and Air Products and Chemicals, Inc., it will eventually be incorporated into both Section 1 (Detroit

[5] The physical constraints of refinery process units as well as existing emissions and operational limits in the ROP effectively limit emissions from the Detroit Refinery.

[6] *"If the emission limit does not reflect the maximum emissions of the process or process equipment operating at full design capacity without air pollution control equipment, then the permit shall contain 1 of the following:*

> *(i) A production limit that restricts the amount of final product that may be produced over the same time period used in the emission limit and that comports with the true design and intended operation of the process or process equipment.*"

Refinery) and Section 3 (Detroit Hydrogen Plant) of the ROP. A draft PTI reflecting proposed enforceable conditions for the Detroit Permitting Project are provided in **Attachment B**.

3 NSR Applicability Analysis

The NSR applicability analysis conducted in this section demonstrates that the Detroit Permitting Project does not trigger PSD or NNSR review for any regulated NSR pollutant emitted from equipment affected by the project, regardless of the designation status of the area surrounding the Detroit Refinery.

3.1 PSD and NNSR Rules

Parts 18 and 19 of Michigan's Administrative Rules for Air Pollution Control implement the federal PSD and NNSR preconstruction permitting programs, respectively. Marathon is currently classified as a major stationary source as defined in R 336.2801(cc) and R 336.2901(u), and in federal permitting programs. The Detroit Permitting Project will allow for an increase in raw material, intermediate stream, and final product throughput. Therefore, the Detroit Permitting Project represents a change in the method of operation of the Detroit Refinery and must be evaluated to determine whether the proposed change constitutes a major modification under the PSD and NNSR rules.

A project is a major modification if the emissions increase resulting from the physical change or change in the method of operation exceeds the significant emission rate thresholds summarized in the table below. For purposes of determining applicability as a major modification, the PSD and NNSR significant emission rate thresholds and the definitions covering emissions change evaluation requirements are identical. For simplicity, only the PSD definitions are cited in this section.

In addition, the Detroit Permitting Project includes multiple voluntary pollution control projects (refer to Section 2.2.2) that are designed to reduce regulated NSR pollutant emissions at the Detroit Refinery. However, construction of three emission control projects will not be completed prior to the proposed throughput increase. Therefore, MPC is not taking credit for the voluntary emissions reductions in the PSD/NNSR emissions change evaluation.

Table 3-1 NSR Significant Emission Rates

Pollutant[A]	Significant Emission Rate (tpy)
Particulate matter (PM)	25
Particulate matter less than 10 microns (PM_{10})	15
Particulate matter less than 2.5 microns ($PM_{2.5}$)[B]	10
Sulfur dioxide (SO_2)	40
Nitrogen oxides (NO_X)	40
Carbon monoxide (CO)	100
Ozone (O_3)	40[C]
Sulfuric Acid Mist (H_2SO_4)	7
Hydrogen Sulfide (H2S)	10
Total Reduced Sulfur (TRS)	10
Greenhouse gases as carbon dioxide equivalents (CO_2e)	75,000[D]

Note(s):

[A] Only those NSR pollutants that are emitted in quantifiable amounts from emissions units affected by this project are shown in the table. Condensable particulate matter is included within the definition of PM_{10}, and $PM_{2.5}$ as of January 1, 2011.

[B] The significant emission rate for direct $PM_{2.5}$ emissions is 10 tpy; additionally, this includes 40 tpy of SO_2 emissions and/or 40 tpy of NO_X emissions unless they are demonstrated not to be a $PM_{2.5}$ precursor.

[C] The NSR significant emission rate is assessed based on emissions of volatile organic compounds (VOC).

[D] Greenhouse gases are defined as the aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. In accordance with 40 CFR § 52.21(b)(49)(iv), greenhouse gases are subject to regulation for a project only if another regulated pollutant also triggers PSD. Because PSD is not being triggered with respect to this permit for other regulated pollutant(s), greenhouse gases are not subject to regulation with respect to the Project and are thus not considered further in this analysis.

3.2 Project Emissions Change Evaluation

The Detroit Permitting Project is limited to a change in the method of operation of existing emission units. Accordingly, MPC evaluated the project emission change using the Actual-to-Projected-Actual (A2PA) test as defined in R 336.2802(4)(c):

> *"The actual-to-projected-actual applicability test may be used for projects that only involve existing emissions units. A significant emissions increase of a regulated new source review pollutant is projected to occur if the sum of the difference between the projected actual emissions and the baseline actual emissions for each existing emissions unit equals or exceeds the significant amount for that pollutant."*

The terms "existing emissions unit," "projected actual emissions," and "baseline actual emissions" as used in this paragraph have specific meaning as ascribed by the applicable rules. An "existing emissions unit" is any part of a stationary source that emits any regulated NSR pollutant and has been in existence for at

least two years from the date it first operated.[7] A description of "baseline actual emissions" (BAE) and "projected actual emissions" (PAE) as it applies to existing emissions units are as follows:

3.2.1 Baseline Actual Emissions

Pursuant to R 336.2801(b)(ii), BAE for an existing, non-electric utility steam generating emissions unit are calculated as:

> *"… [t]he average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 10-year period immediately preceding either the date the owner or operator begins actual construction of the project, or the date a complete permit application is received by the Administrator for a permit required under this section or by the reviewing authority for a permit required by a plan, whichever is earlier, except that the 10-year period shall not include any period earlier than November 15, 1990."*

In accordance with R 336.2801(b)(ii)(D), consecutive 24-month periods were selected on pollutant-specific basis. However, once a consecutive 24-month period was selected for a specific pollutant, that period was used to quantify BAE for each affected emissions unit.

Generally, baseline actual emissions are calculated according to the following hierarchy:

1. CEMS data
2. Performance test results and measured process data
3. Default emission factors (e.g., EPA's AP-42)

Actual monthly emissions, operating parameters, and the resultant BAE for all affected emissions units are provided in **Attachment C**. The combined BAE for all affected emissions units is provided on a pollutant-specific basis in **Table C-1 of Attachment C.**

3.2.2 Projected Actual Emissions

Pursuant to R 336.2801(ll), PAE are based on the following:

> *"… the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source."*

And shall consider in the calculation:

> *"(a) Shall consider all relevant information, including but not limited to, historical operational data, the company's own representations, the company's expected business activity and the company's highest*

[7] R336.2801(r)(ii)

projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans under the approved State Implementation Plan.

(b) Shall include fugitive emissions to the extent quantifiable, and emissions associated with startups, shutdowns, and malfunctions.

With respect to paragraph (*a*), MPC has reviewed historical operating rates, business, and regulatory projections that impact future operating activity, and considered this information in determining projected actual emissions at each affected emissions unit. Specifically, MPC has projected the highest actual annual throughput (*e.g.*, heater firing rate) that would be expected for each affected emissions unit. The annual throughput is multiplied by an emissions factor representative of expected future operation.

As stated in Section 3.1, MPC's PSD/NNSR applicability analyses are conservative in that they do not take credit for the voluntary emission reduction initiatives. To support this argument, MPC is using a projection period for PAE for each pollutant that begins earlier and lasts longer than required by the rule.[8] Specifically, the projection period in the analysis begins upon issuance of the requested permit (i.e., once the product throughput/tank storage limits are removed), before the voluntary emission reduction initiatives are fully implemented. According to the rule, as set forth above, the projection period begins when "the unit resumes regular operation after the project" and continues for five years after that date. MPC's projection period extends to the end of this period.

3.2.3 Excludable Emissions

Pursuant to R 336.2801(ll)(ii)(C), the calculation of PAE shall exclude:

"…that portion of the unit's emissions following the project that an existing emission unit could have been accommodated during the consecutive 24-month period used to establish the baseline actual emissions and that are also unrelated to the particular project, including any increased utilization due to product demand growth."

The US EPA described the exclusion as follows:

"The adjustment to the projected actual emission allows you to exclude from your projection only the amount of the emissions increase that is not related to the physical or operational change(s). In comparing your projected actual emissions to the units' baseline actual emissions, you only count emissions increases that will result from the project. For example, as with the electric utility industry, you may be able to attribute a portion of your emissions increase to a growth in demand for your product if you were able to achieve this higher level of production during the consecutive 24-month period you selected to establish the baseline actual emissions, and the increased demand for the product is unrelated to the change." (67 FR 80196)

[8] For example, for the 16H4 NHT Charge Heater, PAE for NOx is 45.42 tpy based on a projected emission factor of 0.168 lb/MMBtu for the existing heater. Once the project is complete, and this heater has been replaced, the NOx emission factor will be 0.04 lb/MMBtu.

The US EPA has affirmed that the excludable amount cannot be based solely on an assumption that the "unit 'could' have emitted up to its permitted amount during the baseline period and this is the amount that can be excluded from the PAE."[9] Rather, "the emissions that may be excluded are limited by the proposed operating conditions used to project emissions into the future." The source shall "examine the post-change emissions and determine if any such emissions above the baseline are not related to the project. If any of the emissions are not related, and the emissions unit(s) could have emitted at this level before the change if operated as projected, then those emissions may be excluded from the PAE calculation."[10]

Consistent with the rule and related US EPA memoranda, excludable emissions for the Detroit Permitting Project were based on the operating conditions or emission rates experienced during the 24-month baseline period for all affected emissions units. Monthly emissions and operating conditions during the baseline period were evaluated and then annualized taking into account equipment reliability, maintenance, or other limitations on the annual rate. The emissions were adjusted downward, as necessary, to the equivalent production levels (e.g., throughput) currently allowed under permit. This prevents the extrapolation of short-term operational history that could inadvertently mask emissions that are related to the project.

Monthly emissions during the baseline period, the steps employed to calculate excludable emissions, and the resultant adjustment to the PAE are detailed in **Attachment C**.

3.2.4 Replacement Units

As part of the emissions control strategy for the Detroit Permitting Project, MPC proposes to replace two older heaters – NHT Stripper Reboiler (EU16-NHTSTRIPREBOIL-S1) and NHT Charge Heater (EU16-NHTCHARHTR-S1) – with new heaters designed to reduce emissions of NOx.

Pursuant to R 336.2801(r)(ii),

> *"A replacement unit is an existing emissions unit and no creditable emission reductions shall be generated from shutting down the existing emissions unit that is replaced. A replacement unit shall meet all of the following criteria:*
>
> *(A) The emissions unit is a reconstructed unit if the replacement of components of an existing facility is to such an extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost that would be required to construct a comparable entirely new facility or the emissions unit completely takes the place of an existing emissions unit.*
>
> *(B) The emissions unit is identical to or functionally equivalent to the replaced emissions unit.*

[9] April 20, 2010, letter from Ms. Diane McNally with US EPA Region III to Mr. Mark Wejkszner with Pennsylvania Department of Environmental Protection, page 4.
[10] *Id*.

(C) The replacement does not alter the basic design parameters of the process unit.

(D) The replaced emissions unit is permanently removed from the major stationary source, otherwise permanently disabled, or permanently barred from operation by a permit that is enforceable as a practical matter. If the replaced emissions unit is brought back into operation, it shall constitute a new emissions unit."

The proposed NHT heaters meet all four requirements set forth in R 336.2801(r)(ii). The proposed heaters will completely "take the place" of the existing heaters. The fired duty of each proposed heater will be equal to the corresponding NHT heater being replaced; accordingly, the replacement will not alter the basic design parameter of the NHT process unit. The replaced heaters will be permanently removed from service upon startup of the new heaters.

Because each proposed NHT heaters qualifies as a "replacement unit," the emissions change associated with the replacement is evaluated following the A2PA test. Under this scenario, BAE for each existing heater is compared against PAE for the corresponding replacement heater, taking into account any excludable emissions. The BAE and PAE emissions estimates for the heater replacement project are detailed in **Table C-12 of Attachment C**. The heater replacement project will result in a 33.7 tons of NO_x per year emissions reduction.

3.3 "Reasonable Possibility" Recordkeeping Requirements

R 336.2818 defines when an owner/operator of a major source is required to conduct recordkeeping and reporting when using the A2PA emissions test. These requirements are meant to ensure that a significant emissions increase does not actually occur for a pollutant when PAE is used and when the calculated project emissions increase is not significant.[11]

A "reasonable possibility" occurs when the project is calculated to result in either:[12]

"(a) A projected actual emissions increase of at least 50 percent of the amount that is a "significant emissions increase," as defined under paragraph R 336.12801(rr) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR pollutant; or

(b) A projected actual emissions increase that, added to the amount of emissions excluded under paragraph R 336.2801(ll)(ii)(c) of this section, sums to at least 50 percent of the amount that is a

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[11] R 336.2818(3): *"All of the following provisions apply to any regulated new source review pollutant emitted from projects at existing emissions units at a major stationary source, other than projects at a major source with a plant wide applicability limit, where there is a reasonable possibility, as defined in R 336.2818(3)(f), that a project that is not a part of a major modification may result in a significant emissions increase of such pollutant, and the owner or operator elects to use the method specified in R 336.2801(ll)(ii)(A) to (C) for calculating projected actual emissions."*

[12] R 336.2818(3)(f)(1)-(2).

"significant emissions increase," as defined under paragraph R 336.12801(rr) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR pollutant. For a project for which a reasonable possibility occurs only within the meaning of R 336.2818(3)(f)(ii)[13], and not also within the meaning of R 336.2818(3)(f)(i)[14], then the provisions of R 336.2818(3)(b) to (e) do not apply to the project."

During the interim period between permit issuance and implementation of the NHT heater emissions reduction project, MRD is required to complete preconstruction documentation for NOx. The preconstruction documentation requirements are as follows:[15]

"(a) Before beginning actual construction of the project, the owner or operator shall document and maintain a record of all of the following information:

(i) A description of the project;

(ii) Identification of the emissions unit or units whose emissions of a regulated new major source review pollutant may be affected by the project; and

(iii) A description of the applicability test used to determine that the project is not a major modification for any regulated new source review pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under R336.2801(ll)(ii)(C) and an explanation for why such amount was excluded, and any netting calculations, if applicable."

These preconstruction documentation requirements are fulfilled by the information provided in this technical support document. Beyond these preconstruction requirements, monitoring of post-project calendar-year annual actual emissions is required as described below[16].

"The owner or operator shall monitor the emissions of a regulated new source review pollutant that could increase as a result of the project and that is emitted by any emissions unit identified in subdivision (a)(ii) of this subrule; and calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the

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[13] "A projected actual emissions increase of at least 50% of the amount that is a significant emissions increase, as defined in R 336.2801(rr), without reference to the amount that is a significant net emissions increase for the regulated new source review pollutant."

[14] "A projected actual emissions increase that, added to the amount of emissions excluded under R 336.2801(ll)(ii)(C), sums to at least 50% of the amount that is a significant emissions increase, as defined in R 336.2801(rr), without reference to the amount that is a significant net emissions increase for the regulated new source review pollutant. For a project for which a reasonable possibility occurs only within the meaning of R 336.2818(3)(f)(ii), and not also within the meaning of R 336.2818(3)(f)(i), then the provisions of R 336.2818(3)(b) to (e) do not apply to the project."

[15] R 336.2818(3)(a)

[16] R 336.2818(3)(c)

change if the project increases the design capacity or potential to emit of that regulated new major source review pollutant at the emissions unit."

Post-project recordkeeping of NOx emissions from the existing emissions units affected by the Detroit Permitting Project is required to be maintained. To determine if the post-project actual emissions recordkeeping is required for 5 or 10 years, MPC evaluated whether any existing units that use the PAE methodology will increase design capacity or PTE. No existing units for which the PAE methodology was used will have an increase in design capacity or PTE; therefore, post-project actual emissions recordkeeping is required for 5 years as applicable. MPC is required to review its actual emissions annually as follows:

"(e) If the unit is an existing unit other than an electric utility steam generating unit, then the owner or operator shall submit a report to the department if the annual emissions, in tons per year, from the project exceed the baseline actual emissions by a significant amount for that regulated new source review pollutant, and if such emissions differ from the preconstruction projection. The owner or operator shall submit the report to the department within 60 days after the end of such year. The report shall contain all of the following[17]:

(i) The name, address, and telephone number of the major stationary source.

(ii) The annual emissions as calculated under subdivision (c) of this subrule.

(iii) Any other information that the owner or operator wishes to include in the report; for example, an explanation as to why the emissions differ from the preconstruction projection."

MPC will review its post-project calendar-year actual NOx emissions to determine if the emissions exceed the baseline actual emissions by a significant amount and are greater than (differ from) the preconstruction projection. If this occurs, MPC will submit the required report within 60 days after the end of the respective calendar year.

The preconstruction emissions projection is the sum of the projected actual NOx emissions for all project-affected units. To determine whether the post-project calendar-year actual emissions are greater than (differ from) the preconstruction projection, MPC will sum the actual emissions that occur during each calendar year for the affected emissions units.

[17] R 336.2818(3)(e)

4 Regulatory Discussion

4.1 Federal

This section describes key federal regulatory requirements potentially applicable to the Detroit Permitting Project.

4.1.1 NSR

The NSR program categorizes the requirements for new major projects according to the attainment status of the surrounding airshed. An airshed in which the NAAQS are not being met is classified as a nonattainment area and major projects proposed in these areas must obtain emission offsets and meet strict requirements for emissions control referred to as lowest achievable emission technology (LAER). An airshed that is in compliance with the NAAQS is classified as attainment and major source projects proposed in these areas are subject to PSD permitting, including the application of BACT and an air quality impacts analysis to assess compliance with applicable PSD increments and NAAQS.

The Detroit Refinery is located in a portion of Wayne County that is currently designated nonattainment for SO_2.

Consequently, the SO_2 emissions change associated with the Detroit Permitting Project must be evaluated and compared against the applicable significant emission rate threshold to assess NNSR applicability. A similar assessment of PSD applicability to the Detroit Permitting Project is required for all other regulated NSR pollutants.

As described in Section 3, the emissions change associated with the Detroit Permitting Project is less than the PSD and NNSR significant emission rate thresholds. Therefore, the project is classified as a minor modification of an existing major stationary source and is not subject to the requirements of PSD and NNSR review.

4.1.2 New Source Performance Standards (40 CFR Part 60)

The Detroit Refinery is subject to multiple new source performance standards (NSPS) promulgated under 40 CFR Part 60, including the following subparts:

- Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units
- Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units
- Subpart J - Standards of Performance for Petroleum Refineries
- Subpart Ja – Standards of Performance for Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced after May 14, 2007
- Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (including Petroleum Liquid Storage Vessels) for which construction, Reconstruction, or Modification commenced after July 23, 1984

- Subpart VV - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry
- Subpart VVa - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced after November 7, 2006
- Subpart GGG - Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries
- Subpart GGGa - Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced after November 7, 2006
- Subpart QQQ - Standards of Performance for VOC emissions from Petroleum Refinery Wastewater Systems

Pursuant to 40 CFR § 60.14(a) and (b),

> *"Except as provided under paragraphs (e) and (f) of this section, any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act. … Emission rate shall be expressed as kg/hr of any pollutant discharged into the atmosphere for which a standard is applicable."*

The Detroit Permitting Project will result in a change in the method of operation of equipment covered under one or more of the aforementioned applicable NSPS. However, the project is not expected to result in an hourly increase in emissions of any pollutant for which a standard is applicable. Therefore, the Detroit Permitting Project does not qualify as a modification under the NSPS.

4.1.2.1 NSPS Subpart Ja

As part of the emissions reduction strategy associated with the Detroit Permitting Project, MPC proposes to replace two, existing NHT heaters with new heaters that will be regulated under NSPS Subpart Ja.

Pursuant to 40 CFR § 60.102a(g)(i),

> *For each process heater with a rated capacity of greater than 40 million British thermal units per hour (MMBtu/hr) on a higher heating value basis, the owner or operator shall not discharge to the atmosphere any emissions of NO_X in excess of the applicable limits in paragraphs (g)(2)(i) through (iv) of this section.*
>
> *(i) For each natural draft process heater, comply with the limit in either paragraph (g)(2)(i)(A) or (B) of this section. The owner or operator may comply with either limit at any time, provided that the appropriate parameters for each alternative are monitored as specified in § 60.107a; if fuel gas composition is not monitored as specified in § 60.107a(d), the owner or operator must comply with the concentration limits in paragraph (g)(2)(i)(A) of this section.*
>
> *(A) 40 ppmv (dry basis, corrected to 0-percent excess air) determined daily on a 30-day rolling average basis; or*

(B) 0.040 pounds per million British thermal units (lb/MMBtu) higher heating value basis determined daily on a 30-day rolling average basis.

The proposed NHT heaters are designed to comply with the applicable emissions requirements. Pursuant to 40 CFR § 60.107a(c) or (d), MPC will either install a NOx CEMS or conduct biennial performance tests to demonstrate compliance with NOx limits.

4.1.3 National Emission Standards for Hazardous Air Pollutants (40 CFR 63)

The Detroit Refinery is classified as a major source of HAPs and is, therefore, subject the following National Emission Standards for Hazardous Air Pollutants (NESHAPs):

- Subpart CC – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries
- Subpart UUU – National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units and Sulfur Recover Units
- Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
- Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

The proposed change in the method of operation of the Detroit Refinery will not trigger any new requirements under the aforementioned NESHAPs. The new NHT heaters will not impact applicability of Subpart DDDDD for the refinery heaters and boilers.

4.1.4 National Emission Standards for Hazardous Air Pollutants (40 CFR 61)

The Detroit Refinery is also regulated under 40 CFR Part 61, Subpart FF – National Emission Standard for Benzene Waste Operations. The proposed change in the method of operation of the Detroit Refinery will not trigger any new requirements under Subpart FF.

4.2 Michigan Regulations

This section describes key Michigan regulatory requirements potentially applicable to the Detroit Permitting Project.

4.2.1 Michigan Rule 201 (Permit to Install)

Pursuant to R 336.1201(1),

> *"A person shall not install, construct, reconstruct, relocate, or modify any process or process equipment, including control equipment pertaining thereto, which may emit any of the following, unless a permit to install that authorizes such action is issued by the department."*

The Detroit Permitting Project constitutes a modification to the Detroit Refinery. Therefore, a PTI authorizing the proposed changes must be issued by the AQD prior to the installation or the commencement of operation of the proposed changes.

This technical support document constitutes the PTI application package covering the Detroit Permitting Project. The required PTI application form, signed by the Responsible Official, is included in **Attachment A**. Information supporting the PTI application and meeting the requirements of R 336.1203 is provided in this submittal.

4.2.2 Michigan Rules 224-230 (Michigan's Air Toxic Rules)

4.2.2.1 Toxic Best Available Control Technology (T-BACT)

Pursuant to R 336.1224,

> *"A person who is responsible for any proposed new or modified emission unit or units for which an application for a permit to install is required by R 336.1201 and which emits a toxic air contaminant shall not cause or allow the emission of the toxic air contaminant from the proposed new or modified emission unit or units in excess of the maximum allowable emission rate based on the application best available control technology for toxics (T-BACT, except as provided in subrule (2) of this rule."*

R 335.1224(2) defines exceptions to the T-BACT requirement,

> *"The requirement for T-BACT in subrule (1) of this rule shall not apply to any of the following:*
>
> *(a) An emission unit or units for which standards have been promulgated under section 112(d) of the Clean Air Act or for which a control technology determination has been made under section 112(g) or 112(j) of the Clean Air Act for any of the following:*
>
> *(i) The hazardous pollutants listed in section 112(b) of the Clean Air Act.*
>
> *(ii) Other toxic air contaminants that are volatile organic compounds, if the standard promulgated under section 112(d) of the clean air act or the determination made under section 112(g) or 112(j) of the Clean Air Act controls similar compounds that are also volatile organic compounds.*
>
> *(iii) Other toxic air contaminants that are particulate matter, if the standard promulgated under section 112(d) of the clean air act or the determination made under section 112(g) or 112(j) of the Clean Air Act controls similar compounds that are also particulate matter."*

A demonstration of compliance with the T-BACT requirement for existing emissions units affected by the Detroit Permitting Project was conducted during permitting of the DHOUP[18]and therefore does not need to be repeated for this permitting effort. Pursuant to R 336.1224(2)(a):

- Existing process units, tank farm fugitive emission sources (components), and storage tanks are regulated under 40 CFR Part 63, Subpart CC.

[18] The GOHT Charge Heater #2 (EU08-GOHTCHARHTR2-S1) was evaluated for compliance with the T-BACT requirement when it was permitted in 2016.

- Existing sulfur recovery units, FCCU catalyst regenerator, and CCR Platformer Regenerator are regulated under 40 CFR Part 63, Subpart UUU.
- Existing steam generating boilers and process heaters are regulated under 40 CFR Part 63, Subpart DDDDD.

These emissions units will remain subject to the NESHAP requirements promulgated under Section 112(d) of the Clean Air Act. Therefore, pursuant to Rule 224(2)(a), these emissions units are exempt from T-BACT requirements. Further, consistent with previous determinations by the AQD for similar combustion devices, good combustion practices and/or the use of low NO_x burners represents T-BACT for gas-fired heaters of the heat input capacity of the Detroit Refinery process heaters.

The proposed replacement NHT heaters are subject to the requirements of 40 CFR Part 63, Subpart DDDDD. Therefore, pursuant to Rule 224(2)(a), the proposed emission unit is exempt from the T-BACT requirements. Moreover, the proposed NHT heaters will be equipped with ultra-low NO_x burners and will be operated employing good combustion practices in accordance with the design recommendations. Therefore, the proposed NHT heaters would satisfy the T-BACT requirement.

The existing Coke Drum Vent and process upset relief system emits TACs that are VOCs and were shown to be in compliance with the BACT requirements of R 336.1702 when permitted. The Detroit Permitting Project will not affect compliance with R 336.1702. Therefore, pursuant to R 336.1224(2)(c), these emissions units are exempt from the T-BACT requirement.

4.2.2.2 Health-Based Screening Level Requirement

Pursuant to R 336.1225,

> *"A person who is responsible for any proposed new or modified emission unit or units for which an application for a permit to install is required by R 336.1201 and which emits a toxic air contaminant shall not cause or allow the emission of the toxic air contaminant from the proposed new or modified emission unit or units in excess of the maximum allowable emission rate which results in a predicted maximum ambient impact that is more than the initial threshold screening level or the initial risk screening level, or both, except as provided in subrules (2) and (3) of this rule and in R 336.1226."*

The Detroit Permitting Project constitutes a modification to existing emissions units and is, therefore, subject the health-based screening level requirement of R 336.1225. Atmospheric dispersion modeling analyses demonstrating that the Detroit Permitting Project will comply with applicable health-based screening levels have been conducted and are detailed in **Section 5**.

4.2.3 Michigan Rules for Particulate Matter (Part 3)

The Part 3 rules regulate emissions from particulate-generating emissions units. Included in these provisions are general opacity requirements (R 336.1301(a)) and general PM emission limits (R 336.1331(1)). Existing emissions units affected by the Detroit Permitting Project are already subject to and in compliance with the applicable Part 3 rules. The proposed throughput increase will not adversely affect compliance.

The proposed NHT heaters will have the capability to combust natural gas or refinery fuel gas and will be designed to comply with the opacity and emission limits.

4.2.4 Michigan Rule 405 (Emissions from Sulfur Recovery Plants within Wayne County)

Pursuant to Rule 336.1405,

> *"At sulfur recovery plants located in Wayne County, a person shall not cause or allow the emission into the atmosphere of sulfur dioxide, sulfur trioxide, or sulfuric acid from any such sulfur recovery plant to exceed 0.01 pounds per pound of sulfur produced."*

Existing sulfur recovery operations at the Detroit Refinery are subject to and in compliance with the SO_2, sulfur trioxide, and sulfuric acid emissions from sulfur recovery plants limit of 0.01 pounds per pound of sulfur produced. The Detroit Permitting Project will not impact SO_2, sulfur trioxide, and sulfuric acid emissions from the existing SRUs on a pounds per pound of sulfur produced basis. Therefore, the SRUs will remain in compliance with R 336.1405.

4.2.5 Michigan Rule 406 (Hydrogen Sulfide Emissions from Facilities Located within Wayne County)

Pursuant to Rule 336.1406,

> *"(1) A person in Wayne County shall not cause or allow the combustion of any refinery process gas stream that contains hydrogen sulfide in a concentration of greater than 100 grains per 100 cubic feet of gas without removal of the hydrogen sulfide in excess of this concentration.*
>
> *(2) When the odor of hydrogen sulfide is found to exist beyond the property line of a source, a person in Wayne County shall not cause or allow the concentration of hydrogen sulfide to exceed 0.005 parts per million by volume for a maximum period of 2 minutes."*

R 336.1406(1) limits the H_2S concentration of refinery fuel gases. This emission limit is less stringent than the applicable fuel gas sulfur limits under NSPS Subparts J and Ja. The existing fuel gas combustion devices at the Detroit Refinery are currently in compliance with this limit and will remain in compliance after the Detroit Permitting Project. The proposed NHT heaters will be designed to comply with the limit.

R 336.1406(2) prohibits ambient H_2S concentration beyond a stationary source property line from exceeding 0.005 parts per million by volume based on a 2-minute average. The Detroit Refinery will remain in compliance with this requirement after the Detroit Permitting Project.

4.2.6 Michigan Rules for Existing Sources of VOCs (Part 6)

The Part 6 rules regulate VOC emissions from "existing sources", as defined in R 336.1601(a). Compliance requirements for those Part 6 rules that are applicable to existing process and process equipment at the Detroit Refinery are already specified in the ROP. The Detroit Permitting Project will not trigger new Part 6

requirements, nor will it affect compliance with the applicable Part 6 rules. A summary of the applicable Part 6 rules is provided below.

Rule 336.1604 specifies operating requirements for existing fixed roof storage tanks with a capacity greater than 40,000 gallons and that contain an organic compound having a true vapor pressure of more than 1.5 psia, but less than 11 psia at actual storage conditions. The Detroit Refinery operates several storage tanks that are regulated under Rule 336.1604 as well as NSPS Subparts K, Ka, or Kb. These storage tanks are currently in compliance with Rule 336.1604 and will remain in compliance after the Detroit Permitting Project.

Any existing storage tank with a capacity greater than 40,000 gallons and storing an organic compound having a true vapor pressure of 11 psia or more at actual storage conditions is subject to operating requirements under Rule 336.1605. The Detroit Refinery operates several storage tanks that are regulated under Rule 336.1605. These storage tanks are currently in compliance with Rule 336.1605 and will remain in compliance with this rule after the Detroit Permitting Project.

The Vacuum Unit is currently subject to VOC emission control requirements under Rule 336.1615. Vacuum Unit off-gasses are directed to the Gas Concentration Unit or to the Coker Gas Plant for processing. The Vacuum Unit is currently in compliance with Rule 336.1615 and will remain in compliance with this rule after the Detroit Permitting Project.

Rule 336.1616 addresses process unit turnarounds at petroleum refineries. All of the existing hydrocarbon processing units at the Detroit Refinery are subject to Rule 336.1616. The AQD will be notified of process unit turnarounds as required by Rules 336.1616(3) and 336.1616(4). VOC emissions are controlled by depressuring equipment to the flare system or to other process equipment until vessel pressures are less than 5 psi gauge.

Rule 336.1617 governs the operation of the existing API separator. MPC is currently complying with all provisions of Rule 336.1617. The Detroit Permitting Project does not change the applicability of or compliance with Rule 336.1617 to the API separator.

Rule 336.1622 regulates the emissions of VOCs from existing components of petroleum refineries and requires a fugitive VOC monitoring program. MPC has developed a VOC LDAR Program to comply with the applicable requirements of Rule 336.1622.

The storage of petroleum liquids in an existing external floating roof storage tank with a capacity greater than 40,000 gallons and having a true vapor pressure of more than 1.0 psia, but less than 11.0 psia, are subject to the provisions under Rule 336.1623. The Detroit Refinery operates several existing storage tanks that are subject to and operating in compliance with Rule 336.1623. The Detroit Permitting Project does not affect tank compliance with Rule 336.1623. MPC currently complies and will continue to comply with the applicable provisions under Subpart Kb for all of the existing refinery hydrocarbon storage tanks without regard to the actual applicability of Subparts K, Ka, or Kb to the vessel.

4.2.7 Michigan Rule 702 (New Sources of Volatile Organic Compounds)

Pursuant to R 336.1702,

> *"A person who is responsible for any new source of volatile organic compound emissions shall not cause or allow the emission of volatile organic compound emissions from the new source in excess of the lowest maximum allowable emission rate of the following:*
>
> *(a) The maximum allowable emission rate listed by the department on its own initiative or based upon the application of the best available control technology.*
> *(b) The maximum allowable emission rate specified by a new source performance standard…*
> *(c) The maximum allowable emission rate specified as a condition of a permit to install or permit to operate.*
> *(d) The maximum allowable emission rate specified in part 6 of these rules…".*

No new emissions units will be installed as part of the Detroit Permitting Project. Existing emissions units affected by the Detroit Permitting Project include steam generating boilers, process heaters, SRUs, process units with vents (FCCU, SR Platformer, and Coker Unit), and storage tanks. Emission of VOCs from existing affected emissions units/equipment are already limited under the ROP with either R 336.1702 subparts (a), (b), (c), or (d) referenced as the underlying applicable requirement. Emissions from the covered equipment are also limited under NSPS and/or NESHAPS.

Increases to the current ROP-allowable short-term and annual VOC emission limits are not proposed as part of the Detroit Permitting Project. Therefore, compliance with R 336.1702 is demonstrated for the project.

The Detroit Permitting Project includes the installation of new NHT heaters that will replace the two existing NHT heaters. Emissions of VOCs from all existing Detroit Refinery process heaters that have the capability combust refinery fuel gas are currently limited to 0.0055 lb/MMBtu. The underlying applicable requirement for the VOC limit is R 336.1702.[19] The proposed NHT heaters, which will have the capability to combust natural gas or refinery fuel gas, will be designed to comply with the current R 336.1702 emission limit.

4.2.8 Michigan Rule 801 (Emissions of NO_x from non-SIP Call Stationary Sources)

Michigan's Part 8 rules regulate the level of emissions allowed for both State Implementation Plan (SIP) call and non-SIP call stationary sources. The FCCU Regenerator and B&W Boiler are regulated as non-SIP call sources under R 336.1801. Continued compliance with the applicable R 336.1801 emission limits, which are already incorporated into the ROP, will not be affected by the Detroit Permitting Project.

[19] Condition I.32, FGHEATERS-S1, ROP No. MI-ROP-A9831-2012c.

4.2.9 Michigan Prevention of Significant Air Quality Deterioration (Part 18)

Relevant provisions of Michigan's PSD rules are described in Section 3.1.

4.2.10 Michigan NSR for Major Sources Impacting Nonattainment Areas (Part 19)

Relevant provisions of Michigan's NNSR rules are described in 3.1.

4.2.11 Michigan Modeling Policy and Procedure Document (AQD-022)

In 2015, the AQD issued Air Quality Policy and Procedure AQD-022: Dispersion Modeling Guidance for Federally Regulated Pollutants (the Guidance) which establishes air quality demonstration guidelines for projects that do not trigger PSD review. Air quality demonstration requirements (i.e., dispersion modeling or qualitative assessment) under the Guidance are based on project classification, project emission rates, and stack height/orientation. However, unlike the PSD/NNSR regulations, "project emissions" are defined under the Guidance as:

> *"The project emissions are associated with the installation and/or modification at the stationary source. Also, if a PSD applicability determination or PSD netting analysis is included in the application, the point at which you determine if a demonstration is required is the emissions increase prior to taking into account any decreases."*

Because the above definition narrows the PSD definition of project emissions to only the emissions increase prior to taking into account any decreases, regulated NSR pollutant emissions associated with the Detroit Permitting Project are above the significant emission rate thresholds. Therefore, pursuant to the Guidance, an air quality demonstration must be conducted for the Detroit Permitting Project.

Dispersion modeling analyses demonstrating that the emissions change associated with the Detroit Permitting Project will result in air quality impacts less than US EPA-established significant impact levels (SILs) have been conducted and are described in **Section 5**.

5 Air Modeling Analyses

5.1 Overview

Atmospheric dispersion modeling analyses of the Detroit Permitting Project demonstrating that the Detroit Refinery will continue to comply with applicable PSD increments and NAAQS, as well as Michigan's Air Toxics Rules have been conducted. The model simulations were conducted in accordance with the US EPA's Guideline on Air Quality Models (40 CFR Part 51, Appendix W), additional relevant guidance published by the US EPA, and guidance published by the AQD.

The air quality dispersion model, supporting databases, modeling methodology, and model-predicted air quality impacts are described below. An electronic copy of all modeling databases and model input/output files are being submitted electronically concurrent with this application (**Attachment J**).

5.2 Dispersion Model and Modeling Databases

Model simulations were conducted using the AMS/EPA Regulatory Dispersion Model (AERMOD, Release No. 22112). AERMOD is currently recommended and approved for use in industrial source modeling applications by the US EPA and the AQD. AERMOD is designed to simulate conditions associated with this air quality impact analysis, including:

- Urban dispersion conditions;
- Flat and simple terrain features;
- Dispersion influenced by nearby buildings and structures;
- Transformation of NO_x to nitrogen dioxide (NO_2) during transport; and
- Concentration estimates over short-term and annual averaging periods.

Consistent with US EPA and AQD guidance, all AERMOD simulations were conducted in the Regulatory Default mode.

5.2.1 Land Use

Atmospheric conditions affecting the downwind dispersion of air contaminants may be influenced by localized land use. The developers of AERMOD have designed the model to simulate emissions sources located in both rural and urban environments. To assess whether the modeling domain is located in a rural or urban environment, U.S. EPA guidance[20] suggests using a land use typing scheme developed by Auer.[21]

Utilizing satellite imagery, land use within a three-kilometer radius of the Detroit Refinery has been assessed in accordance with the Auer procedure and can be classified as urban. Consistent with recent AQD-approved modeling analyses of the Detroit Refinery, the AERMOD simulations were conducted in

[20] Guideline on Air Quality Models, 40 CFR Part 51, Appendix W, U.S. EPA, January 2017.
[21] Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology, 1978.

urban mode. A population of 999,558, representing Detroit and nearby communities,[22] was input to the required URBANOPT command.

5.2.2 Receptor Points

AERMOD-predicted concentrations may be estimated at discrete receptor locations. In accordance with US EPA guidance, a discrete Cartesian receptor grid was developed with sufficient density to identify maximum modeled regulated NSR pollutant and TAC impacts associated with the Detroit Permitting Project. Public access to the Detroit Refinery is precluded by fencing that surrounds all sections of the stationary source. Railroad lines bisecting the refinery are closed off to the public using a combination of physical barriers, security cameras, and signage.

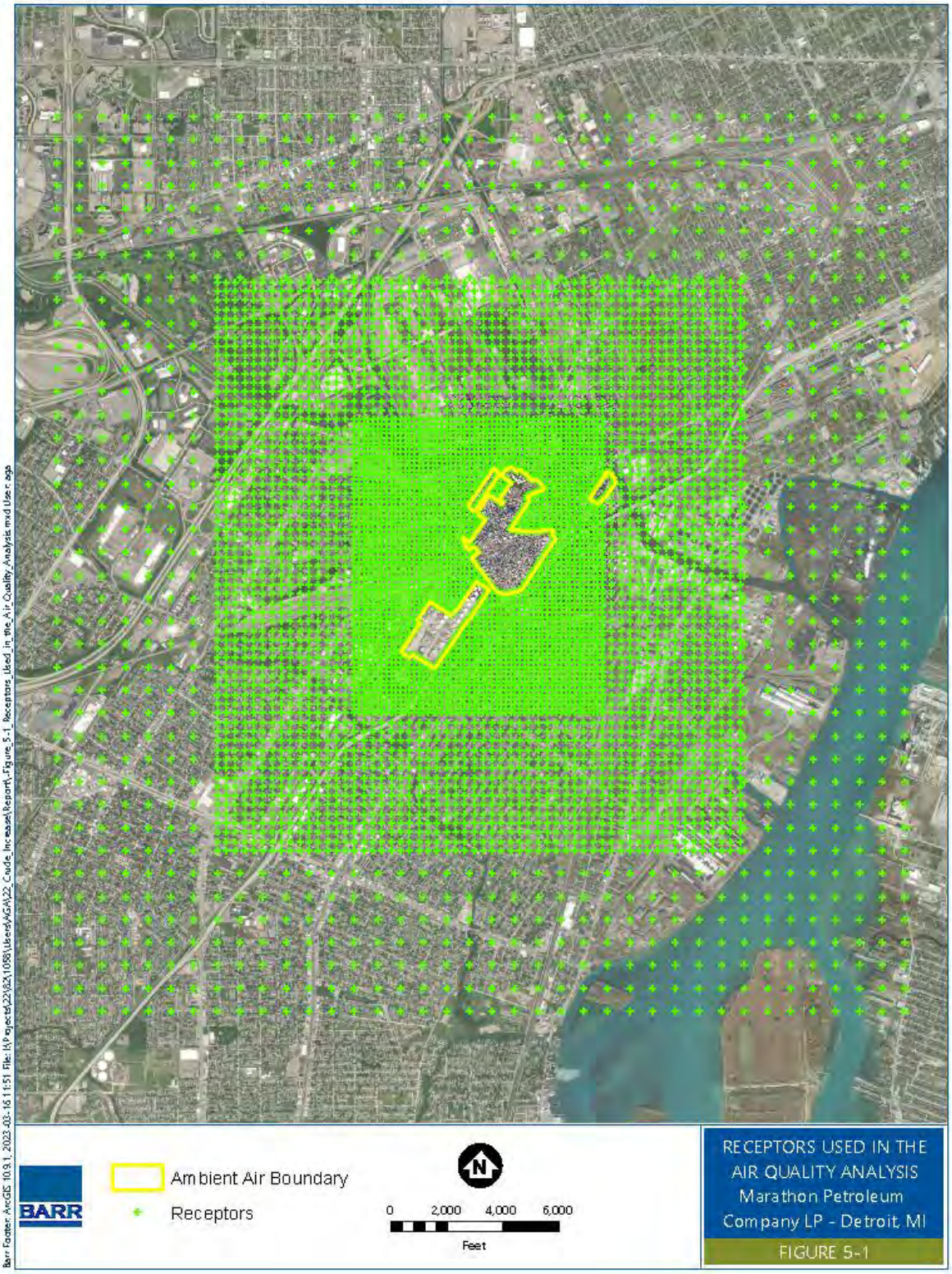
Discrete receptor points were developed according to the following methodology:

- Receptors were located along the Detroit Refinery property boundary at distances not exceeding 25 meters;
- Receptors were located at 50-meter spacing out to a distance of approximately 500 meters from the center of the refinery; and
- Receptors were located at 100-meter spacing out to a distance of approximately two kilometers from the center of the refinery. and
- Receptors were located at 250-meter spacing out to a distance of approximately four kilometers from the center of the refinery.

The receptor grid used in the air quality impact analysis consists of 7,270 discrete receptor points and is shown in Figure 5.1.

[22] Based on 2016 census data for Detroit, Dearborn, Dearborn Heights, Melvindale, Allen Park, Inkster, River Rouge, Lincoln Park, Ecorse, and Taylor.

Figure 5-1 Receptors Used in the Air Quality Analysis



5.2.3 Terrain Elevations

Elevated terrain features may affect the transport of atmospheric contaminants as well as serve as areas of potentially higher pollutant impacts. Where appropriate, terrain features should be included in a modeling analysis. A review of topographic projection data reveals only minor variations in terrain elevations at and nearby the Detroit Refinery. To account for these minor variations, terrain elevations for each modeled receptor point and emission source were obtained using the U.S. EPA's AERMAP preprocessor (Release No. 18081) in conjunction with digital terrain data in National Elevation Dataset (NED) format. AERMAP-calculated terrain elevations were subsequently input to AERMOD.

5.2.4 Meteorological Data

The AQD generally requires the use of the most spatially and temporally representative five-year meteorological database when conducting model simulations of a regulated NSR pollutant and a one-year meteorological database when conducting model simulations of a TAC. Because it is located in an urban setting, the AQD has historically recommended the use of surface observations measured at the Detroit City Airport ("Detroit City", Station No. 14822), combined with coincident upper air observations measured at the National Weather Service station located in White Lake, Michigan (Station No. 04830) to evaluate air quality impacts associated with the Detroit Refinery.

Consistent with previous modeling demonstrations for the Detroit Refinery, five years (2018-2022) of the Detroit City Airport/White Lake meteorological database, preprocessed by the AQD in 1-minute U*adj format, were employed in the regulated NSR pollutant compliance demonstration. One year (2022) of the Detroit City Airport/White Lake meteorological database was employed in the TAC screening level compliance demonstration.

5.2.5 Exhaust Parameters

Emission sources modeled in support of the Detroit Permitting Project compliance demonstration include combustion units (heaters/boilers), process unit vents, material handling operations, storage tanks, emissions control equipment, and fugitive components (e.g., valves, flanges). Consistent with previous Detroit Refinery air quality impact analyses reviewed and approved by the AQD, emission source exhaust parameters were input to AERMOD according to the following methodology:

- Combustion sources, process unit vents, and emissions control equipment were modeled as point sources, which require as input stack/vent location, height, insider diameter, exit temperature, exit velocity, and orientation (vertical or horizontal). Point source exhaust parameters input to AERMOD are summarized in **Table D-1 of Appendix D**.
- Fugitive emission sources, including leaking components associated with project-affected process units and storage tanks, will vent to the atmosphere at various locations within the Detroit Refinery. Due to the configuration of the process equipment, fugitive emissions have the potential to occur concurrently at varying heights. Therefore, it is appropriate to model the equipment as one or more unique volume sources (dependent on the configuration of the affected process unit), which require as input volume location, release (centerpoint) height, initial lateral dimension

(sigma y), and initial vertical dimension (sigma z). Volume source parameters input to AERMOD are summarized in **Table F-1 of Appendix F**.

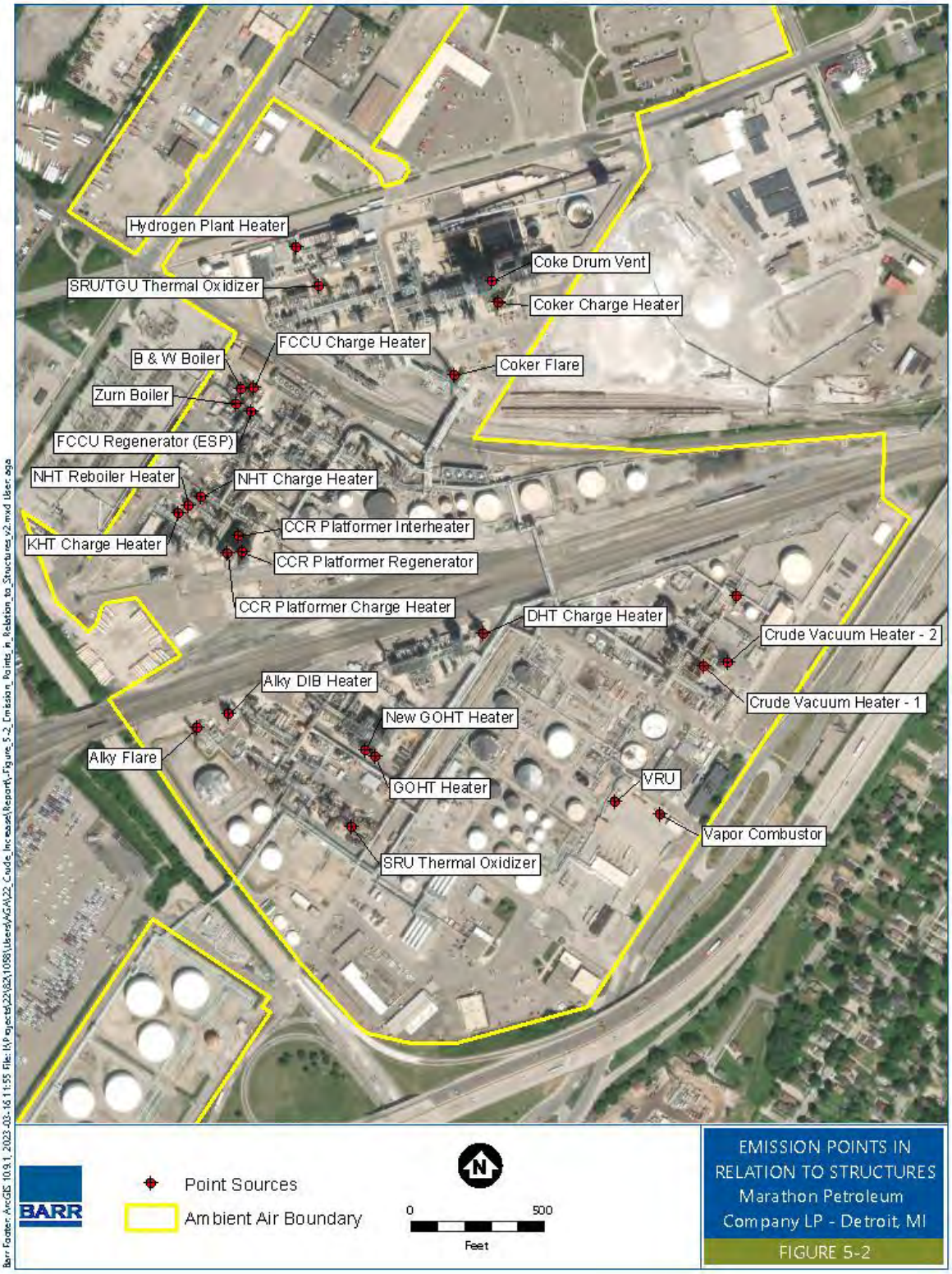
- Emissions from affected storage tanks vent to the atmosphere primarily through vents or rim seals associated with each tank's roof. Therefore, it is appropriate to model each tank as an elevated area source based on the tank's diameter and height. Area source parameters required as input to AERMOD include location, release height, side width and length, initial vertical dimension, and orientation angle. Area source parameters input to AERMOD are also summarized in **Table F-1 of Appendix F**.

5.2.6 Building Downwash Effects

Structures located at the Detroit Refinery have the potential to influence plumes emitted from affected point sources. To assess aerodynamic downwash effects on the modeled emission points, the U.S. EPA-recommended BPIP-PRIME program (Release No. 04274) was used to estimate the maximum projected lateral and vertical dimensions of those structures that could influence the modeled point sources on a wind direction-specific basis.

BPIP-PRIME requires as input the dimensions of all proposed structures that could potentially influence emissions from the modeled point sources. Maximum projected lateral and vertical dimensions of influencing structures, as calculated by BPIP-PRIME, were subsequently input to AERMOD. Modeled emission points in relation to potentially influencing structures are shown in Figure 5-2 below.

Figure 5-2 Emission Points in Relation to Structures



5.3 Regulated NSR Pollutant Modeling

The emissions change associated with the Detroit Permitting Project does not trigger PSD or NNSR. Further, the Detroit Permitting Project, which includes voluntary emissions controls, will not result in emissions above what is already allowed under permit.

Notwithstanding the above, dispersion modeling analyses were conducted at the AQD's request to demonstrate that the Detroit Permitting Project will not cause or contribute to an exceedance of the PSD increments or NAAQS. The demonstration consisted of comparing maximum modeled impacts from the project emissions change[23] against significant impact levels (SILs) established by the US EPA. The analyses are conservative in that they do not include the emissions reductions associated with the proposed pollution control projects. Once implemented, the pollution control projects will result in even lower modeled impacts.

When maximum modeled impacts of a regulated NSR pollutant are less than its applicable SIL, the source is considered to have an insignificant impact on air quality and additional modeling analyses to demonstrate compliance with PSD increments or NAAQS are typically not necessary. A cumulative impacts assessment to demonstrate compliance with applicable PSD increments and NAAQS is typically required for each regulated NSR pollutant with a maximum modeled impact above its applicable SIL.

5.3.1 Significant Impact Evaluation

Utilizing AERMOD over a five-year meteorological database (2018-2022 Detroit City/White Lake), model simulations of the CO, NO_x, SO_2, PM_{10}, and $PM_{2.5}$ project emissions change were conducted, and resultant concentrations were compared against the relevant SILs. Highest, first-highest modeled impacts were compared against the SILs for those regulated NSR pollutants with short-term averaging period SILs. Maximum annual modeled impacts were compared against the SILs for those regulated NSR pollutants with annual averaging period SILs.

Model-predicted CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ impacts are compared against the relevant SILs in Table 5-1 below. As shown in the table, maximum predicted impacts are well under the SILs for all regulated pollutants over all applicable averaging periods. Therefore, the Detroit Permitting Project has an insignificant impact on CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ air quality. A demonstration that the Detroit Permitting Project has an insignificant impact on ozone air quality is provided in Section 5.3.4.

Note that maximum predicted impacts occur at or near the Detroit Refinery property boundary and decrease with distance. Concentration levels at nearby neighborhoods will be even lower than what is shown in Table 5-1.

[23] Summarized in **Table C-4 of Attachment C**, the project emission change is the difference between baseline actual emissions and projected actual emissions, accounting for excludable emissions.

Table 5-1 Comparison of Modeled Impacts Against Significant Impact Levels

Regulated NSR Pollutant	Averaging Period	Maximum Modeled Impact (µg/m^3)	Significant Impact Level (µg/m^3)
CO	1-Hour	0.2	2,000
	8-Hour	0.1	500
SO_2	1-Hour	0.3	7.9
	3-Hour	0.3	25
	24-Hour	0.1	5
	Annual	0.01	1
NO_2	1-Hour	2.4	7.52
	Annual	0.1	1
PM_{10}	24-Hour	0.1	5
	Annual	0.3	1
$PM_{2.5}$	24-Hour	0.1	1.2
	Annual	0.01	0.2

Tables supporting the modeling of regulated NSR pollutants, including source location and exhaust parameters, modeled emission rates, and model-predicted impacts, are provided in **Attachment D**.

5.3.2 Atmospheric Transformation of NO_x to NO_2

The NO_2 SIL evaluation described above was conducted for emissions of NO_x from the affected emission units. The US EPA has developed the following three-tier approach to assess the transformation of NO_x to NO_2 during transport of an emission point to a downwind receptor:

- Tier 1 – Assume full conversion during transport.
- Tier 2 – Use representative equilibrium ratios of NO_2/NO_x to assess the level of conversion during transport. This technique is identified as the Ambient Ration Method 2 (ARM2).
- Tier 3 – Implement detailed screening techniques that account for ambient ozone levels and the relative amount of NO_x and NO_2 emitted from the source. Two Tier 3 techniques have been approved for use by the U.S. EPA – the Ozone Limiting Method (OLM) and the Plume Volume Molar Ratio Method (PVMRM).

Model simulations to evaluate NO_2 impacts were conducted in accordance with the ARM2 methodology proscribed in Section 4.2.3.4(d) of the Guideline on Air Quality Models. As a conservative step, the national default minimum ambient NO_2/NO_x ratio of 0.5 and the maximum ambient ratio of 0.9 were input to AERMOD for all NO_x simulations.

5.3.3 Project Impact on Ozone Air Quality

The Detroit Permitting Project includes a project emissions change (before installation of voluntary emissions reduction projects) of 1.7 tons of VOCs per year and 30.1 tons per year of NO_x, both of which are regulated as ozone precursors. Wayne County is currently designated attainment for ozone. Though the Detroit Permitting Project does not trigger PSD for ozone, analyses demonstrating that the project emissions change will not have a significant impact on the ozone NAAQS has been conducted.

In its current guidance,[24] the US EPA has established a two-tiered system for quantitatively assessing ozone formation due to precursor emissions. Following the Tier 1 methodology, a demonstration that the NO_x and VOC emissions change from the Detroit Permitting Project will not result in a significant ozone impact was conducted. This demonstration utilized maximum modeled concentrations based on illustrative ozone precursor modeled emission rates obtained from the MERPs View Qlik application[25] posted on the US EPA's Support Center for Regulatory Atmospheric Modeling (SCRAM) website. Following the guidance, an estimate of ozone formation using data from the nearest hypothetical source, located in Macomb County, is calculated as follows:

> *Maximum permitted source Tier 1 8-hour impact (ppb O_3) = Predicted surrogate 8-hour impact from VOC emissions (ppb O_3) + Predicted surrogate 8-hour impact from NO_X emissions (ppb O_3)*

Where:

- Predicted surrogate impact from VOC emissions = [Source VOC emissions (tons/year)] * [Modeled air quality impact from hypothetical source VOC emissions (ppb O_3)] / [Modeled VOC Emission Rate from hypothetical source (tons/year)]; and
- Predicted surrogate impact from NO_X emissions = [Source NO_X emissions (tons/year)] * [Modeled air quality impact from hypothetical source NO_X emissions (ppb O_3)] / [Modeled NO_X Emission Rate from hypothetical source (tons/year)]

The modeled contributions from the 500 tons/year NO_X and VOC low-level source at the Macomb location were: 0.94 ppb O_3 for NO_X and 0.28 ppb for VOC.

The projected emissions increase for the Detroit Permitting Project before voluntary emissions reduction projects is: 30.1 tons/year for NO_X and 1.7 tons/year for VOC.

NO_X surrogate impact (ppb O_3) = 30.1 tons NO_X/year * 0.94 ppb O_3 / 500 tons NO_X/year = 0.056 ppb O_3

VOC surrogate impact (ppb O_3) = 1.7 tons VOC/year * 0.28 ppb O_3 / 500 tons VOC /year = 0.001 ppb O_3

[24] Revised DRAFT Guidance for Ozone and Fine Particulate Matter Permit Modeling, U.S. EPA, September 2021.

[25] [MERPs View Qlik | US EPA] https://www.epa.gov/scram/merps-view-qlik#Modeled_Impacts

The total maximum predicted ozone impact from the Detroit Permitting Project is 0.057 ppb, which is only 5.7 percent of the 1 ppb ozone SIL. Therefore, as shown above, the Detroit Permitting Project will have an insignificant impact on ozone air quality.

5.4 Compliance with Michigan's Air Toxics Screening Level Requirement

R 336.1225(1) requires new or modified sources of TAC emissions to demonstrate that the ambient impact of each emitted TAC is less than its corresponding initial threshold screening level (ITSL), initial risk screening level (IRSL), or both, if applicable. In accordance with R 336.1227(1)(c), dispersion model simulations demonstrating continued compliance with applicable health-based screening levels has been conducted for all TACs potentially emitted from project-affected emissions units.

The model simulations were conducted utilizing AERMOD over a one-year meteorological database (2022 Detroit City/White Lake). Resultant maximum predicted impacts were compared against applicable AQD-published screening levels. For those potentially emitted TACs with no published screening level, maximum predicted impacts were compared against screening levels developed in accordance with the protocol specified in R 336.1231 and R 336.1232. With one exception,[26] this limited subset of screening levels was reviewed and approved by the AQD during the permitting of the Detroit Heavy Oil Upgrade Project (DHOUP).

5.4.1 Combustion Unit Impact Evaluation

Sources affected by the Detroit Permitting Project that have the potential to emit TACs as products of combustion include boilers, heaters, and the FCCU and CCR regenerators. Potential TAC emissions due to the combustion of refinery fuel gas in the emissions units were estimated using emission factors published in the US EPA Factor Information Retrieval ("FIRE") Data System, source classification code 1-02-007-01 *External Combustion Boilers Firing Refinery Fuel Gas*. Potential TAC emissions due to the combustion of natural gas in the combustion unit were estimated using emission factors published in Chapter 1.4 of the US EPA's Compilation of Air Pollutant Emission Factors (AP-42).

Emission rates to demonstrate compliance with 1-hour, 8-hour, and 24-hour screening levels were based on the short-term boiler and heater firing limits specified in the ROP. Emission rates to demonstrate compliance with annual screening levels were based on a continuous operating schedule of 8,760 hours per year. For both short-term and annual screening levels, compliance was demonstrated under the conservative assumption that all the affected emissions units will operate at their potential to emit concurrently across the applicable averaging period.

[26] A screening level was not previously developed for one of the components of a catalyst currently used at the FCCU Regenerator. An ITSL of 88 µg/m^3 (annual) was developed for the catalyst component, Zeolites (1318-02-1), based on a published no-observed-adverse-effect level (NOAEL), in accordance with Rule 232(1)(e).

Potential TAC emissions from the FCCU regenerator were based on the contents of the catalysts, the use of additives to reduce emissions, projected ammonia slip, and the projected coke burn rate. Potential hydrogen chloride (HCl) emissions from the CCR regenerator were based on the ROP concentration limit of 10 ppm. Potential sulfuric acid mist (SAM) emissions from the CCR regenerator were based on the assumption that 5% of fuel sulfur will be converted to sulfuric acid mist. Potential ammonia emissions from the hydrogen plant heater were based on a 10% ammonia slip from the selective catalytic reduction control device.

Affected emissions units were individually modeled at a hypothetical one gram per second emission rate to assess maximum 1-hour, 8-hour, 24-hour, and annual averaging period impacts, on a per-stack basis. Maximum predicted TAC-specific impacts, on an emission unit-specific basis, were then estimated by multiplying the maximum short-term TAC emission rate (in grams per second) by the maximum predicted unit emission rate impact over the applicable averaging period. The maximum predicted TAC-specific impact for each modeled emission unit was then combined (regardless of location of the maximum impact) and compared against the applicable health-based screening level.

The conservative screening approach described above resulted in predicted TAC impacts less than the applicable screening levels. Therefore, compliance with the Rule 225 screening level requirement has been demonstrated for the evaluated TACs. A listing of each TAC potentially emitted from the boilers, heaters, and regenerators, emission factors and estimated potential emission rates, individual emission unit-specific TAC impacts, is provided in **Attachment E**. A of combined TAC impacts against the applicable screening levels is provided in **Table E-1 of Attachment E**.

The affected emissions units also have the potential to emit TACs that are classified as polycyclic aromatic hydrocarbons (PAHs). Compliance with the Rule 225 screening level requirement for PAH emissions was demonstrated in accordance with the relative potency factor approach detailed in guidance published by the AQD[27]. For purposes of this evaluation, the emission unit that resulted in the highest modeled annual average hypothetical emission rate impact (KHT Heater) was conservatively used to generate a total benzo(a)pyrene equivalent predicted ambient impact. The results of the relative potency factor approach are summarized in **Table E-2 of Attachment E**. As shown in the table, the total benzo(a)pyrene equivalent predicted ambient impact is 0.0004 µg/m^3, which is less than the benzo(a)pyrene IRSL of 0.001 µg/m^3. Therefore, compliance with Rule 225 for PAHs has been demonstrated.

5.4.2 Product Stream Impact Evaluation

Hydrocarbon model run simulations representing processing operations at the Detroit Refinery were also conducted.[28] Consistent with the DHOUP permitting, 22 individual TACs including petroleum

[27] Screening Levels for Polycyclic Aromatic Hydrocarbons, Interoffice Communication, AQD Toxics Unit, February 2017.
[28] The modeling methodology and run streams are consistent with those reviewed and approved by the AQD in support of the DHOUP permitting.

hydrocarbons, crude oil, intermediate and final product streams (e.g., kerosene production, gasoil production), and sulfur-based compounds (e.g., H_2S) were evaluated.

To demonstrate that the entire Detroit Refinery will remain in compliance with the screening level requirement, potential emissions from equipment not affected by the Detroit Permitting Project (e.g., fugitive leaks from process unit components and finished product loading operations) were included in the product stream impact evaluation. Each simulation was based on the unlikely assumption that the modeled sources will emit concurrently at their potential to emit.

Potential VOC emissions from individual tanks are summarized in **Table C-87 of Attachment C**. Potential fugitive VOC emission rates from process units, sulfur recovery operations, tank farms, and product loading operations are detailed in **Attachment G**.

Fugitive emissions from potentially leaking components associated with storage tanks were based on the service type of the individual tank, i.e., Light Liquid (LL) or Heavy Liquid (HL), and total emissions from the Tank Farm. This was accomplished by taking the total Tank Farm emission rate and determining the portion of emissions from LL tanks, HL tanks, and drains. Dividing the total LL emissions by the number of LL tanks and HL emissions by the number of HL tanks and distributing drain emissions equally among LL and HL tanks, a VOC emission rate was allocated for each tank within a tank farm. Tank service type and estimated fugitive VOC emission rates for each tank are provided in **Table F-1 of Attachment F**, with supporting documentation in **Attachment G**.

Estimated fugitive H_2S emission rates are provided in **Table F-16 of Attachment F** (Run 16), with supporting documentation for process units in **Attachment H**. Storage tank service type and estimated fugitive H_2S and other TRS emission rates for each tank are provided in **Table I-1 of Attachment I**, with supporting documentation in **Attachment I**.

Modeled TAC emission rates, modeling parameters, AQD-approved screening levels, and model-predicted impacts for each of the 22 modeled runs streams are detailed in **Attachment F** and are summarized in Table 5-4 below. As shown in the table, compliance with the health-based screening level requirement has been demonstrated for each of the 22 modeled product streams.

Table 5-2 Hydrocarbon Run Stream Simulations

Run Stream	TAC	Averaging Period	Max. Modeled Impact (µg/m^3)	ITSL/IRSL (µg/m^3)
Petroleum Hydrocarbon	Petroleum	8-Hour	814	3,500
	Heavy Alkylate Naphtha	8-Hour	814	3,500
Gasoline	Gasoline	Annual	72	200
Crude Naphtha	Full Range SR Naphtha	Annual	18	18
Crude Kerosene	Deodorized Kerosene	8-Hour	141	2,000
		Annual	17	200
Crude Distillate	Straight Run Middle	Annual	5.6	36
Crude Gasoil	Dist., Crude Oil	Annual	6	19
Vacuum Resid	Residues, Vacuum	Annual	13	16
NHT Product	Naphtha, Hydrodesulf. Heavy	Annual	9.1	14
KHT Product	Kerosene, Hydrodesulf.	8-Hour	39	2,000
		Annual	5	200
DHT Product	Hydrodesulf. Middle Dist.	Annual	0.1	2
Hydrotreated Gasoil	Hydro. Light Naphthenic Dist.	8-Hour	27.1	50
	Hydro. Light Paraffinic Dist.	8-Hour	27.1	50
	Hydro. Heavy Naphthenic Dist.	8-Hour	27.1	50
	Hydro. Heavy Paraffinic Dist.	8-Hour	27.1	50
FCC/LCO	Light Catalytic Cracked Dist.	Annual	5.7	93
FCC Slurry	Clarified Oils Cat. Cracked	Annual	5.1	12
FCC Naphtha	Light Cat. Cracked Naphtha	Annual	8	5,600
Platformer Product	Cat. Reformed Naphtha	Annual	17	350
Hydrogen Sulfide	Hydrogen Sulfide	24-Hour	10.6	100
		Annual	2.5	10
Coker Naphtha	Thermocracked Heavy Naphtha	Annual	36	5,600
Coker Distillate	Light Thermally Cracked Dist.	Annual	11.5	93
Coker Distillate and FCC/LCO	Light Thermally Cracked Dist.	Annual	12	93
	Light Cat. Cracked Dist.	Annual	12	93
Coker Gasoil	Thermocracked Heavy Dist.	Annual	11.5	15
Non-H_2S Reduced Sulfur	Methyl Mercaptan	1-Hour	5.5	10
	Dimethyl Sulfide	Annual	0.5	7
	Carbon Disulfide	Annual	0.5	700
	Carbonyl Sulfide	Annual	0.5	9
	Dimethyl Disulfide	24-Hour	1.5	1,200
		Annual	0.5	16
Diesel Sales	Diesel	Annual	5.4	70

5.4.2.1 Gasoline Evaluation (Run 2)

Consistent with the DHOUP permitting, compliance with the gasoline screening level requirement (Run 2) was demonstrated by complying with the secondary risk screening level (SRSL) and 10 times SRSL requirement in R 336.1225(3)(b)(ii).[29] Pursuant to R 336.1225(3),

> *"If the ambient impacts of a carcinogen occur on industrial property or public roadways, as an alternative to complying with subrule (1) or (2) of this rule, a person may instead demonstrate compliance with either of the following provisions:*
>
> *(a) The maximum allowable emission rate of the carcinogen from the proposed new or modified emission unit or units results in ambient impacts that meet both of the following requirements:*
>
> *(i) The maximum ambient impact on industrial property or public roadways is less than or equal to the initial risk screening level multiplied by a factor of 10.*
>
> *(ii) The maximum ambient impact on all property that is not industrial or a public roadway is less than or equal to the initial risk screening level.*
>
> *(b) The total allowable emissions of the carcinogen from the proposed new or modified emission unit or units and all existing emission units at the stationary source result in ambient impacts that meet both of the following requirements:*
>
> *(i) The maximum ambient impact on industrial property or public roadways is less than or equal to the secondary risk screening level multiplied by a factor of 10.*
>
> *(ii) The maximum ambient impact on all property that is not industrial or a public roadway is less than or equal to the secondary risk screening level."*

Following this methodology, the extent of the modeled SRSL impacts is shown in Figure 5-3 below.

[29] Coincident with the project, the stack height of the Vapor Recovery Unit controlling emissions from the gasoline load rack will be turned unobstructed vertically and will be increased to a height of 32 feet above grade level.

Figure 5-3 Compliance with Gasoline Screening Level (Run 2)