AIR PERMIT ROUTING/APPROVAL SLIP-Permits

7-25-24

AI No.	234532	**Company**	Mitsubishi Chemical America, Inc.	**Date Received**	
Activity No.	PER20220002	**Facility**	MCA Geimar Site	**Permit Type**	
CDS No.	0180-00233	**Permit**	PSD-LA-850	**Expedited**	☒ yes ☐ no

1. Technical Review	**Approved**	**Date rec'd**	**Date FW**	**Comments**
Permit Writer	Dan		7/24/23	
Air Quality / Modeling	ymu		7/24/23	
Toxics				
PSD/NNSR				
Technical Advisor			8/21/2023	as noted.
Supervisor				
Other				
2. Management Review (if PN req'd)	**Approved**	**Date rec'd**	**Date FW**	**Comments**
Supervisor				
Manager				
Administrator	BDJ		11/20/23	as noted
Assistant Secretary (PN)			11/29/23	Public hearing ☒ yes ☐ no
3. Response to Comments (if PN req'd)	**Approved**	**Date rec'd**	**Date FW**	**Comments**
Supervisor				
Manager				
Administrator	BDJ		7/18/24	as noted
Legal (BFD)				
4. Final Approval	**Approved**	**Date rec'd**	**Date FW**	**Comments**
Supervisor				
Manager				
Administrator	BDJ		7/18/24	
Assistant Secretary	AGV		7/24/24	

1. Technical Review

PN of App needed	☒ yes ☐ no	Date of PN of App		Newspaper	
Fee paid	☒ yes ☐ no				
NSPS applies	☒ yes ☐ no	PSD/NNSR applies	☒ yes ☐ no	NESHAP applies	☒ yes ☐ no

2. Post-Technical Review

Company technical review	☒ yes ☐ no ☐ n/a	E-mail date	7/21/23	Remarks received	☒ yes ☐ no
Surveillance technical review	☐ yes ☐ no ☐ n/a	E-mail date		Remarks received	☐ yes ☐ no

3. Public Notice

Public Notice Required	☒ yes ☐ no	Initial PSD	
Library			
LDEQ Website	PN Date	12/28/23	PH 2/1/24
Company notification e-mail sent	Date e-mailed	12/20/23	
EPA PN notification e-mail sent	Date e-mailed	12/20/23	
OES PN mailout	Date mailed	12/21/23	

4. Final Review

Public comments received	☐ yes ☐ no	EPA comments rec'd	☐ yes ☐ no	
Company comments received	☐ yes ☐ no	PN info entered into Permit Sec VI	☐ yes ☐ no	
Comments	11225560			

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11/7/2017

JEFF LANDRY
GOVERNOR

AURELIA S. GIACOMETTO
SECRETARY

STATE OF LOUISIANA

DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL SERVICES

Certified Mail No. 7020 1290 0000 8584 8277

Agency Interest No. 234532
Activity No.: PER20220002

Mr. Hootan Hidaji
Mitsubishi Chemical America, Inc.
6070 Poplar Avenue, Suite 600
Memphis, TN 38119

RE: Prevention of Significant Deterioration (PSD) Permit, PSD-LA-850
Mitsubishi Chemical America, Inc. – MCA Geismar Site
Geismar, Ascension Parish, Louisiana

Dear Mr. Hidaji:

Enclosed is your permit, PSD-LA-850. Construction of the proposed MCA Geismar Site is not allowed until such time as the corresponding Part 70 operating permit is issued.

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

Should you have any questions, please contact Dan Nguyen of the Air Permits Division at (225) 219-3395 or dan.nguyen@la.gov.

Sincerely,

Amanda Vincent, PhD, PMP
Assistant Secretary

July 24, 2024
Date

AV/DCN
c: EPA Region 6

Post Office Box 4313 • Baton Rouge, Louisiana 70821-4313 • Phone 225-219-3181 • Fax 225-219-3309
www.deq.louisiana.gov

Agency Interest No. 234532

PSD-LA-850

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

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

Mitsubishi Chemical America, Inc.
6070 Poplar Avenue, Suite 600
Memphis, TN 38119

is authorized to construct and operate the MCA Geismar Site at

36453 Highway 30
Geismar, Louisiana 70734

subject to the emission limitations, monitoring requirements, and other conditions set forth herein.

This permit and authorization to construct shall expire at midnight on January 24, 2026, unless physical on site construction has begun by such date, or binding agreements or contractual obligations to undertake a program of construction of the source are entered into by such date.

Signed this 24th day of July, 2024.

Amanda Vincent, PhD, PMP
Assistant Secretary

Office of Environmental Services
Louisiana Department of Environmental Quality

BRIEFING SHEET

Mitsubishi Chemical America, Inc. - MCA Geismar Site
Agency Interest No.: 234532
Geismar, Ascension Parish, Louisiana

I. APPLICANT

Applicant:	Mitsubishi Chemical America, Inc. 6070 Poplar Avenue, Suite 600 Memphis, TN 38119
Facility:	MCA Geismar Site
SIC Code:	2821

II. LOCATION

The MCA Geismar Site will be located 36453 Highway 30, Ascension Parish, Louisiana.

III. REVIEWING AGENCY

Louisiana Department of Environmental Quality (LDEQ)
Office of Environmental Services/Air Permits Division
P.O. Box 4313
Baton Rouge, Louisiana 70821-4313

IV. PURPOSE

Mitsubishi Chemical America, Inc. (MCA) has applied for a PSD permit for the MCA Geismar Site.

V. PROJECT DESCRIPTION

MCA proposes to construct and operate the MCA Geismar Site to produce 385,000 tons of methyl methacrylate (MMA) monomer per year. The proposed site will consist of a carbon monoxide (CO) plant, a methanol plant, a formalin plant, and an Alpha MMA plant. The site will also include product storage; wastewater treatment; miscellaneous auxiliary support facilities; and associated maintenance, startup, and shutdown activities. All major feedstocks, including ethylene, oxygen, and natural gas, will be provided to the site via pipeline.

VI. APPLICABILITY AND REGULATED POLLUTANTS

The requirements of LAC 33:III.509 (Prevention of Significant Deterioration) apply to the construction of a major stationary source. The MCA Geismar Site will be a major stationary source as defined in LAC 33:III.509.B, as it is a "stationary source that emits, or has the potential to emit, 100 tons per year or more of any air pollutant (except for GHGs)."

BRIEFING SHEET

Mitsubishi Chemical America, Inc. - MCA Geismar Site
Agency Interest No.: 234532
Geismar, Ascension Parish, Louisiana

Emissions from the proposed MCA Geismar Site, in tons per year (tpy), are as follows:

Pollutant	**Emissions**	**PSD Significance Level**	**PSD Review?**
Particulate Matter - PM_{10}	39.60	15	Yes
Particulate Matter - $PM_{2.5}$	38.69	10	Yes
Sulfur Dioxide - SO_2	1.84	40	No
Nitrogen Oxides - NO_X	129.39	40	Yes
Carbon Monoxide - CO	521.41	100	Yes
Volatile Organic Compounds - VOC	69.79	40	Yes
Greenhouse Gas - CO_2e	780,752	75,000	Yes

VII. PRELIMINARY DETERMINATION

LAC 33:III.509.Q.2.a requires LDEQ to "make a preliminary determination whether construction should be approved, approved with conditions, or disapproved." Based on the findings set forth in the Preliminary Determination Summary, the Office of Environmental Services has made a preliminary determination to approve construction of Mitsubishi Chemical America, Inc.'s MCA Geismar Site in Geismar, Ascension Parish, Louisiana, subject to the allowable emissions rates and specific conditions established herein.

VIII. PROCESSING TIME

Application Date:	October 21, 2022
Additional Information Date:	June 28, 2023; November 1, 2023; May 16, 2024
Effective Completeness Date:	October 30, 2023

IX. PUBLIC NOTICE

In accordance with LAC 33:III.509.Q.2.c, a notice requesting public comment on the proposed permit was published on the department's website on December 28, 2023. On December 21, 2023 copies of the public notice were mailed to the individuals who have requested to be placed on the mailing list maintained by the Office of Environmental Services (OES). The proposed permit was submitted to EPA on December 20, 2023. A public hearing was held on February 1, 2024 at the Richard Brown Community Center, 12060 Highway 73, Geismar, Louisiana 70734. Comments received during the comment period, including comments received at the public hearing, were considered prior to the permit decision. The proposed permit and SOB, along with the Public Comments Response Summary, were again submitted to EPA on May 24, 2024, in accordance with 40 CFR 70.8(a)(1)(ii) and LAC 33:III.533.B.2.b.

PRELIMINARY DETERMINATION SUMMARY

Mitsubishi Chemical America, Inc. - MCA Geismar Site
Agency Interest No.: 234532
Geismar, Ascension Parish, Louisiana
PSD-LA-850 – October 30, 2023

PSD REQUIREMENTS

This Preliminary Determination Summary summarizes the results of the reviews and analyses required by LAC 33:III.509. PSD requirements are outlined below.

A. Control Technology Review [LAC 33:III.509.J]

   1. Best Available Control Technology (BACT)
   2. Collateral Environmental Impacts

B. Air Quality Analysis [LAC 33:III.509.M]

   1. Preconstruction Monitoring
   2. Background Concentrations

C. Source Impact Analysis [LAC 33:III.509.K]

   1. Preliminary Screening
   2. National Ambient Air Quality Standards
   3. PSD Increments [LAC 33:III.509.C]
   4. Secondary $PM_{2.5}$ Formation

D. Additional Impact Analyses [LAC 33:III.509.O]

   1. Visibility
   2. Soils and Vegetation
   3. Commercial, Residential, Industrial, and Other Growth

E. Additional Requirements for Sources Impacting Class I Areas [LAC 33:III.509.P]

In the event of a discrepancy in the provisions found in the application and those in this Preliminary Determination Summary, the Preliminary Determination Summary shall prevail.

PRELIMINARY DETERMINATION SUMMARY

Mitsubishi Chemical America, Inc. - MCA Geismar Site
Agency Interest No.: 234532
Geismar, Ascension Parish, Louisiana
PSD-LA-850 – October 30, 2023

A. CONTROL TECHNOLOGY REVIEW

Best Available Control Technology

Per LAC 33:III.509.J.2, a major stationary source shall apply best available control technology (BACT) for each regulated NSR pollutant that it would have the potential to emit in significant amounts.

Consistent with EPA guidance, LDEQ utilizes the "top-down" approach to determine BACT.[1] This approach involves determining the most stringent control technique available for a similar or identical source. If it can be shown that this level of control is infeasible based on technical considerations or adverse energy, environmental, or economic impacts, it is rejected, and the next most stringent level of control is determined and similarly evaluated. This process continues until a control level is arrived at which cannot be eliminated due to technical difficulties or environmental, energy, or economic impacts. However, BACT may not result in emissions of any pollutant that would exceed an applicable standard under 40 CFR Part 60, 61, or 63. The five steps in the top-down process are described below.[2]

Step 1

The first step in a "top-down" analysis is to identify all "available" control options. Available control options are those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation.

Step 2

In the second step, the technical feasibility of each control option identified in step 1 is evaluated with respect to source-specific (or emissions unit-specific) factors. Technically infeasible control options are then eliminated from further consideration.

Step 3

In step 3, all control alternatives not eliminated in step 2 are ranked in order of overall control effectiveness for the pollutant under review, with the most effective control

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[1] Note that it remains EPA's *policy* to use the top-down process to determine BACT. According to EPA's "PSD and Title V Permitting Guidance for Greenhouse Gases":

> EPA has not established the top-down BACT process as a binding requirement through rule. Thus, permitting authorities that implement an EPA-approved PSD permitting program contained in their State Implementation Plans (SIPs) may use another process for determining BACT in permits they issue ... so long as that process (and each BACT determination made through that process) complies with the relevant statutory and regulatory requirements. (p. 19, internal citations omitted).

[2] Where the top-down process does not provide meaningful information (e.g., if there is only one available control option), LDEQ may not summarize each of the five steps.

alternative at the top. An applicant proposing the top control alternative need not provide cost and other detailed information in regard to other control options.[3]

Step 4

Next, the energy, environmental, and economic impacts of the available and technically feasible control options are considered. Impacts influencing LDEQ's BACT determination are addressed in this Preliminary Determination Summary; those which do not result in the elimination of a control option are detailed in the permit application.

Step 5

The most effective control option not eliminated in step 4 is selected as BACT.

CO MeOH Auxiliary Boiler - B6109 (EQT0001)
CO MeOH Fired Heater - B6101 (EQT0002)
MMA Plant HTF Package Heater A - B7801A (EQT0003)
MMA Plant HTF Package Heater B - B7801B (EQT0004)
MMA Plant HTF Package Heater C - B7801C (EQT0005)
POx Unit Start-up Burner - L6104 (EQT0006)

BACT FOR $PM_{10}/PM_{2.5}$ EMISSIONS

Step 1 – Identify All Control Technologies

1. Use of Gaseous Fuels;
2. Good Combustion Practices and Proper Burner Design;
3. Baghouses or Fabric Filters;
4. Electrostatic Precipitator; and
5. Venturi or Pack Bed Scrubbers.

Step 2 – Eliminate Technically Infeasible Options

Use of Gaseous Fuels

Pipeline quality natural gas is known to burn very cleanly. With regard to fossil fuels, use of natural gas as fuel is generally considered to result in the lowest PM_{10} and $PM_{2.5}$ emission rates achievable. The use of clean burning gaseous fuels could also serve to minimize particulate emissions resulting from incomplete combustion. In fact, the combustion of process gas streams may result in particulate emissions comparable to that of natural gas.

MCA will exclusively use gaseous fuel in the boiler and process heaters to minimize particulate matter emissions. Natural gas will be used as fuel for the burner pilot, and it

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[3] "New Source Review Workshop Manual" (draft), October 1990 (p. B.8)

will be use as needed to sustain the combustion in the combustion equipment. With the use of other gaseous fuels, particulate emissions from the combustion equipment will be minimized.

Good Combustion Practices and Proper Burner Design

PM emissions can be minimized using good combustion practices such as good equipment design, use of gaseous fuels for good mixing, and proper combustion techniques such as maintaining the optimum air-to-fuel ratio. Effective combustion controls diminish the likelihood of fuel-rich conditions that may promote soot formation. Good combustion practices are the BACT exclusively approved for particulate emission control for gas-fired units. Good combustion practices are considered technically feasible.

Baghouses or Fabric Filters

A fabric filter, often referred to as a baghouse, utilizes fabric filtration to remove particles from a gas stream by depositing the particles on fabric material. The filter's ability to collect small particles is due to the accumulated dust cake, not the fabric itself. The filter is usually in the form of cylindrical fabric bags, hence the name "baghouse," but it may also be in the form of cartridges that are constructed of fabric, sintered metal, or porous ceramic. In general, fabric filters are capable of collection efficiencies greater than 99%. As dust builds up on the filter surface, the pressure drop across the filter increases. In order to avoid excessively high pressure drops, the filter material is cleaned periodically. The most common methods of cleaning are shaking, reverse air, and reverse pulse or pulse jet. During cleaning, particles are deposited in a hopper for subsequent disposal.

Fabric filters are used for medium and low gas flow streams with high particulate concentrations. Due to the high volumetric flow rates and low particulate concentrations in the exhaust streams of the combustion units, a fabric filter is technically infeasible and is eliminated from further consideration.

Electrostatic Precipitators

An ESP operates by electrically charging particles in a gas stream so the particles can be separated from the gas with a collector of the opposite charge. High voltage direct current discharge electrodes, typically wires, are suspended in the gas stream to impose a negative charge on the particles. The particles are driven to positive collecting electrodes (typically plates) located opposite the wires. Particles are removed from the collection plates by rapping devices that strike the collection and discharge electrodes. Dust falls into hoppers and is then conveyed to a disposal system.

ESP effectiveness depends on particle size distribution and the gas flow rate, stream temperature, and composition. ESPs are typically found on boilers that are fired with a solid fuel such as coal. Particles generated by such units are coarser and more numerous than those generated by gas-fired units. A large percentage of the particles in a gas-fired unit are small, which makes their charge difficult to control. Moreover, these particles are carbon in nature with little or no ash, a fact that further hinders the ability of an ESP to control their charge. Carbon has a low resistance, which enhances electrical conductivity, but loses charge quickly. Loss of charge can result in re-entrainment into the gas stream before collection by a rapper/hopper system. Particle size, composition, and gas properties make the application of an ESP to a gas-fired combustion unit technically infeasible. Therefore, an ESP is eliminated and is no longer considered in the subsequent analysis.

Venturi or Pack Bed Scrubbers

Venturi or packed bed scrubbers are types of air pollution controls collectively referred to as "wet scrubbers," which remove particulates by inertial and diffusional interception. Inlet gas temperatures are usually in the range of 4 to 400°C. For PM applications, wet scrubbers generate waste in the form of a slurry. This creates the need for both wastewater treatment and solid waste disposal. Initially, the slurry is treated to separate the solid waste from the water. The treated water can then be reused or discharged. Once the water is removed, the remaining waste will be in the form of a solid or sludge. If the solid waste is inert and nontoxic, it can generally be landfilled. Hazardous wastes will have more stringent procedures for disposal. Wet scrubbers are technically infeasible since the particulate matter consists of fine particles, so high liquid-to-gas ratios would be required.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

Use of gaseous fuels in combination with good combustion practices and proper burner design to limit $PM_{10}/PM_{2.5}$ emissions to no more than 0.0075 lbs/MM BTU is determined as BACT.

BACT FOR NOx EMISSIONS

NO_X formed during combustion results from either thermal reactions, fuel-bound nitrogen reactions, or prompt NOx. Below is a description of all formation mechanisms.

Thermal NO_X formation: The thermal NO_X mechanism was first proposed by Zeldovich and involves radicals to produce the overall reaction of combining oxygen and nitrogen. A series of chemical reactions occur in which oxygen and nitrogen present in the combustion air dissociate and react to form NO_X. Above 2800°F, thermal NO_X formed through the Zeldovich mechanism is an exponential function of combustion temperature and a linear function of residence time. When the combustion temperature is lower than 2,800°F, the rate of NO_X formation decreases significantly. Thus, reducing combustion temperature is commonly used in practice to reduce thermal NO_X emissions. This BACT evaluation will address thermal NO_X reduction due to its significant contribution to the total NO_X.

Fuel bound NO_X formation: When nitrogen-containing fuel is burned, the nitrogen content of the fuel is liberated and then participates in NO_X reactions in the combustion chamber. Since natural gas or fuel gas will be used as fuel for the proposed boilers and heaters, fuel-bound nitrogen is considered a minor contributor to overall NO_X emissions. Therefore, this BACT evaluation will not address techniques that reduce fuel-bound nitrogen.

Prompt NO_X: This mechanism was first discovered by C.P. Fenimore in 1971. Prompt NO_X is formed near the flame zone and demonstrates less temperature dependence than that formed through Zeldovich mechanism discussed above. Near the flame zone, radicals such as O and OH enhance the rate of NO_X formation. Some NO_X, therefore, will form despite aggressive controls on flame temperature and oxygen concentration. Hence, although prompt NO_X contributes less to the total amount of NO_X released by conventional combustors, it contributes a more notable percentage to the NO_X produced by combustors using low/ultra-low NO_X burners.

In stationary source combustion, the majority of the nitrogen oxides produced is NO, which continues to oxidize in the atmosphere. Control strategies for NO_X may be classified as pre-combustion control, combustion control, and post-combustion control (flue gas treatment). Pre-combustion control strategies typically involve switching to other fuels with lower nitrogen contents or removing nitrogen from the fuel with a treatment technology. This BACT evaluation does not address pre-combustion control strategies due to the fact that the proposed boiler will be fueled by natural gas and fuel gas, which does not contain significant amount of nitrogen, and the majority of the NO_X formed during the combustion of fuel gas and natural gas is due to combustion air nitrogen. Combustion control techniques employ fuel or air staging that affect the kinetics of NO_X formation by reducing the peak flame temperature or introducing inerts (combustion products, for example) that limit initial NO_X formation by lowering the available O_2. Post-combustion NO_X control techniques utilize various chemicals to reduce NO_X emissions by converting the NO_X to elemental nitrogen before it is released to the atmosphere. The chemical reactions occur with or without a catalyst.

Step 1 – Identify All Control Technologies

1. Selective Catalytic Reduction (SCR);
2. Low-NO_X Burners;
3. Flue Gas Recirculation (FGR);
4. Selective Non-Catalytic Reduction (SNCR);
5. Non-Selective Catalytic Reduction (NSCR); and
6. EMx^{TM}.

Step 2 – Eliminate Technically Infeasible Options

Selective Catalytic Reduction (SCR)

Selective catalytic reduction (SCR) involves injecting aqueous or anhydrous ammonia (NH_3) into the flue gases upstream of a catalyst bed. On the catalyst surface, NH_3 reacts with NO and NO_2 to form N_2 and water (H_2O). The SCR reactor is sized based on exhaust gas parameters to provide a certain gas velocity and residence time in the catalyst bed. The optimum temperature for SCR depends on the catalyst, but is usually between 500°F and 750°F.

$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$
$8NH_3 + 6NO_2 \rightarrow 7N_2 + 12H_2O$
$4NH_3 + 2NO_2 + O_2 \rightarrow 3N_2 + 6H_2O$

SCR system operation typically results in the release, or "slip," of unreacted NH_3. Slip can occur when the catalyst has not reached the optimal temperature, when the NH_3 and NO_X mixing is incomplete, or when the catalyst loses activity. SCR technology is in widespread use for boilers and process heaters with heat input greater than 100 MMBtu/hr.

Low-NOx Burners

A low NOx burner is considered a combustion control, as it is designed to minimize combustion temperatures by delaying combustion by staging the air or fuel in multiple zones, which spreads the flame over a larger area. The initial fuel-air mixture is deliberately made very rich or very lean, which slows the combustion process and reduces the peak flame temperatures and thermal NO production. Staging is limited by the need to maintain a stable flame. A LNB that incorporates techniques such as internal or self-recirculating flue gas, steam injection, or a combination of techniques is referred to as an ultra-low NO_X burner (ULNB).

Flue Gas Recirculation

Flue gas recirculation (FGR) returns some of the combustion exhaust gas back to the combustion zone with reduced oxygen levels. Inert gas dilution and reduced oxygen results in lower peak flame temperatures, inhibiting thermal NO formation. Fuel/air mixing in the combustion zone is intensified by the recirculated flue gas when introduced into the flame during the early stages of combustion. The intensified mixing offsets the decrease in flame temperature and results in lower NO levels.

Selective Non-Catalytic Reduction

Selective non-catalytic reduction (SNCR) is a post-combustion NO_X control technology in which a selective reagent, either ammonia or urea, is injected into the flue gas to reduce NO_X/NO_2 to form N_2 and H_2O without the use of a catalyst. To effectively reduce the emissions of NO_X/NO_2 emissions, SNCR requires uniform mixing of the reagent into the flue gas and relatively high temperatures within a limited range. The optimum temperature range for SNCR is between 1600°F and 2000°F. Operation outside the optimum temperature range will severely impact the effectiveness of this control technology. Above the upper end of the temperature range, the reagent will convert to NO_X/NO_2, and below the lower end of the temperature range, the desired chemical reactions will not proceed, and the injected reagent will be emitted as ammonia slip. To achieve the necessary mixing and reaction, the residence time of the flue gas within this temperature window must be at least one half second.

Due to the strict requirement on operating temperature, SNCR has previously only been applied to the control of NOx emissions from sources that operate within well-defined operating ranges and do not change rapidly across those ranges, such as large boilers and FCCUs. Consistent with efficient combustion practices, the flue gas temperatures of the proposed boilers and process heaters are expected to be below the lower end of the optimal temperature window required for SNCR. As a result, duct burners would be necessary to raise the temperature of the exhaust gas, which would result in additional combustion-related emissions and additional energy requirements. Therefore, SNCR is considered technically infeasible and is eliminated from further consideration.

Non-Selective Catalytic Reduction

Non-selective catalytic reduction (NSCR) is a technology used for exhaust streams with a very low oxygen content (< 0.5%). NSCR systems use a catalyst comprised of three different catalyst types used in series that reduce emissions of CO and VOC, as well as NOx. It requires precise adjustments of process conditions such as oxygen content and temperature and works best within certain windows of inlet concentrations of NOx, CO, and VOC. It has been effective only in fuel-rich environments where combustion gases contain very low levels of oxygen. NSCR has only been applied to engines because it is impractical to tune a fired combustion source such as a boiler or a process heater to combust in a fuel rich manner. As a result, NSCR is considered to be technically infeasible for the proposed boiler and heaters and is removed from further review.

EMx^{TM}

The EMx^{TM} system (formerly referred to as SCONOx^{TM}) is an add-on control technology that simultaneously oxidizes CO to CO_2, VOCs to CO_2 and H_2O, NO to NO_2, and then adsorbs the NO_2 onto the surface of a potassium carbonate-coated catalyst to reduce such emissions. The EMx^{TM} system does not require injection of a reagent as required by SCR and SNCR and operates most effectively within temperature range of 300°F to 700°F. The overall chemical reaction between NO_2 and the potassium carbonate catalyst is as follows:

$$2NO_2 + K_2CO_3 \rightarrow CO_2 + KNO_2 + KNO_3$$

The catalyst has a finite capacity to react with NO_2. As a result, to maintain the required NO_X/NO_2 removal rate, the catalyst must be periodically regenerated. Regeneration is accomplished by passing a reducing gas containing a dilute concentration of hydrogen across the surface of the catalyst in the absence of oxygen. Hydrogen in the regeneration gas reacts with the nitrites and nitrates adsorbed on the catalyst surface to form H_2O and N_2. CO_2 in the regeneration gas reacts with the potassium nitrite and nitrates to form potassium carbonate, the original form of the chemical in the catalyst coating. The overall chemical reaction during regeneration is as follows:

$$KNO_2 + KNO_3 + 4H_2 + CO_2 \rightarrow K_2CO_3 + 4H_2O + N_2$$

The regeneration gas is produced in a gas generator using a two-stage process to produce H_2 and CO_2. In the first stage, natural gas and air react across a partial oxidation catalyst to produce CO and H_2. Then steam is added to the gas mixture, and subsequently the mixture passes across a low temperature shift catalyst to form CO_2 and more H_2. The regeneration gas mixture is diluted to less than 4% H_2 using steam. To accomplish the periodic regeneration, the EMx™ system is constructed in numerous modules, which operate in parallel, so that one module can be isolated and regenerated while the remaining modules are lined up to treat the exhaust gas stream.

Commercial installations of EMx™ units in the US are very limited. All of these are on natural gas-fired combustion turbines of 45 MW or less, and there are no known commercial applications on boilers and process heaters. A number of differences exist between the operation and flue gas characteristics of combustion turbines and those of the proposed boilers and process heaters. Specifically, regardless of the load, combustion turbines are essentially a constant flue gas flow combustion device. The flue gas flow rates of boilers and process heaters are directly proportional to the load. The effect of load-following flue gas flow rates on the operation of EMx™ technology is unknown. In addition, because the oxygen concentration (~ 15%) in gas turbine flue gas is higher than that of a boiler or process heater (~ 3%), the NOx concentration in the boiler and process heater flue gases is much higher than that in the combustion turbine flue gases. The effect of the flue gas oxygen content and NOx concentration on the effectiveness of EMx™ is also unknown. Taking into account of the aforementioned factors' unknown impacts on the performance of EMx™, this control technology is considered technically infeasible for boilers and process heaters. Therefore, EMx™ is eliminated from further consideration.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Technology	**NOx Emissions (lb/MMBtu)**	
	Natural Gas Fired	Fuel Gas Fired
SCR	0.01	0.015
LNB or ULNB + FGR	0.0125	0.015
FGR	< 0.10	< 0.10
LNB	0.10	≤ 0.15
Standard Burners (Base Case)	0.19	0.19

Step 4 – Evaluate Most Effective Controls

Because the POx Unit Start-up Burner (EQT0006) has a rating of only 8 MM BTU/hr and is permitted to operate for only 200 hours per year, additional NOx controls are not cost-effective.

Step 5 – Select BACT

For the CO MeOH Auxiliary Boiler; CO MeOH Fired Heater; and Package Heaters A, B, and C (EQT0001 through EQT0005), low NOx burners and SCR are selected as BACT for NOx emissions during normal operation periods. During startups, shutdowns, and SCR maintenance periods, low NOx burners are BACT. For the POx Unit Start-up Burner (EQT0006), good combustion practices are BACT. Details are listed in the following table.

ID	Operation	Time Limit (hours/year)	BACT	Limits (lbs/MM BTU)	Averaging Period
EQT0001	Normal	8760	LNB+SCR	0.015	30-day rolling
	SU/SD	100	LNB	0.13	hourly
	SCR Maintenance	36	LNB	0.13	hourly
EQT0002	Normal	8760	LNB+SCR	0.015	30-day rolling
	SU/SD	100	LNB	0.15	hourly
	SCR Maintenance	36	LNB	0.15	hourly
EQT0003	Normal	8760	LNB+SCR	0.01	hourly
EQT0004	SU/SD	100	LNB	0.10	hourly
EQT0005	SCR Maintenance	36	LNB	0.10	hourly
EQT0006	Normal	200	Good Combustion Practices	0.098	-

BACT FOR CO EMISSIONS

Emissions of CO from the boiler and process heaters result from incomplete fuel combustion. CO will form under non-ideal operating conditions such as low combustion temperatures, insufficient residence time, and low oxygen levels due to inadequate mixing and/or low air-to-fuel ratio in the combustion zone. Measures taken to minimize the formation of NO_X during combustion may inhibit complete combustion, which can result in increased CO emissions. Lowering combustion temperature through staged combustion to reduce NO_X emissions can be counterproductive with regard to CO emissions. However, the improved air/fuel mixing that is inherent in current LNB technology helps to overcome the impact of fuel and/or air staging on CO emissions.

Step 1 – Identify All Control Technologies

1. Good Combustion Practices and Proper Equipment Design and Operation; and
2. Oxidation Catalyst.

Step 2 – Eliminate Technically Infeasible Options

Good Combustion Practices and Proper Equipment Design and Operation

MCA will incorporate all the following practices:

- Good combustion;
- Proper equipment design and operation; and
- Use of LNB technologies.

Combustion control is the most effective means to reduce CO emissions from gas-fired boilers and process heaters. Good combustion is a function of the three T's – Temperature, Turbulence, and Time.

- Temperature must be high enough to ignite the fuel.
- Turbulence must be vigorous enough for the fuel to be exposed to the oxygen.
- Time must be long enough to assure complete combustion.

These components of combustion efficiency are designed into the proposed boiler and process heaters to maximize fuel efficiency and reduce operating costs. Therefore, combustion control is accomplished primarily through boiler design and operation. The use of combustion practices is considered technically feasible and considered further in this analysis.

Oxidation Catalyst

Oxidation catalyst is typically a precious metal catalyst (e.g., platinum), which has been applied over a metal or ceramic substrate. The catalyst lowers the activation energy required for the oxidation of CO to temperatures between 400°F and 1100°F. No chemical reagent addition is required.

Oxidation catalyst technology has been applied to gas-fired boilers and process heaters and many combustion turbines. Thus, it is considered technically feasible to reduce CO emissions. Though oxidation catalyst will oxidize a significant portion of the sulfur compounds in the fuel to sulfur trioxide, which then combines with water to form sulfuric acid mist, this is not a significant issue when firing sweet natural gas or low sulfur fuel gas.

The POx Unit Start-up Burner L6104 (EQT0006) is relatively small (8.0 MM BTU/hr) with an operating schedule of no more than 200 hours per year. CO emissions from the burner will be 0.07 tons/year. Any add-on controls for CO emissions, including CO oxidation catalyst, are not practical.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Technology	**CO Emissions (ppmvd)**
Oxidation Catalyst + Good Combustion Practices and Proper Equipment Design and Operation	≤ 10
Good Combustion Practices (Base Case for EQT0001 – EQT0005)	50

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

(1) Good combustion practices and proper equipment design and operation.
(2) Compliance with 40 CFR 63 Subpart DDDDD.
(3) Oxidation catalyst.

ID	**Operating** hrs/yr	**BACT**	**Limits (ppmvd)**	**Averaging @ 3% O_2**
EQT0001	Normal	1 + 2 + 3	10	One-hour
EQT0001	SU/SD - 100	1 + 2	500	One-hour
EQT0002	Normal	1 + 3	5	One-hour
EQT0002	SU/SD - 100	1	500	One-hour
EQT0003 – EQT0005	Normal	1 + 2 + 3	5	One-hour
EQT0003 – EQT0005	SU/SD - 100	1 + 2	500	One-hour
EQT0006	200	1 + 2	0.082 lbs/MM BTU	Hourly Average

BACT FOR VOC EMISSIONS

VOC emissions from boilers and process heaters result from incomplete fuel combustion. If not completely combusted, the heavier molecular weight components of the tail gas and/or natural gas will generate VOC emissions. Thus, combustion practices that promote high combustion temperature, long residence times at those temperatures, and turbulent mixing of fuel and combustion air minimize VOC emissions.

Step 1 – Identify All Control Technologies

1. Good Combustion Practices and Proper Equipment Design and Operation; and
2. Oxidation Catalyst (for CO and/or VOC).

Step 2 – Eliminate Technically Infeasible Options

Good Combustion Practices and Proper Equipment Design and Operation

MCA will incorporate all the following practices:

- Good combustion;
- Proper equipment design and operation; and
- Use of LNB technologies.

Combustion control is the most effective means to reduce VOC emissions from gas-fired boilers and process heaters. Good combustion is a function of the three T's – Temperature, Turbulence, and Time.

- Temperature must be high enough to ignite the fuel.
- Turbulence must be vigorous enough for the fuel to be exposed to the oxygen.
- Time must be long enough to assure complete combustion.

These components of combustion efficiency are designed into the proposed boiler and process heaters to maximize fuel efficiency and reduce operating costs. Therefore, combustion control is accomplished primarily through boiler/heater design and operation. The use of combustion practices is considered technically feasible and considered further in this analysis.

Oxidation Catalyst

Oxidation catalyst is typically a precious metal catalyst (e.g. platinum), which has been applied over a metal or ceramic substrate. The catalyst lowers the activation energy required for the oxidation of VOC so that the VOCs can be oxidized at temperatures between 800°F and 1100°F. No chemical reagent addition is required.

Oxidation catalyst technology has been applied to gas-fired boilers and process heaters and many combustion turbines. Thus, it is considered technically feasible to reduce VOC emissions. Though oxidation catalyst will oxidize a significant portion of the sulfur compounds in the fuel to sulfur trioxide, which then combines with water to form sulfuric acid mist, this is not a significant issue when firing sweet natural gas or low sulfur fuel gas.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Technology	**VOC Emissions (lb/MMBtu)**
CO Oxidation Catalyst + Good Combustion Practices and Proper Equipment Design and Operation	0.0027
Good Combustion Practices (Base Case)	0.0054

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

1. CO Oxidation Catalyst.
2. Good combustion practices and proper equipment design and operation.
3. Compliance with 40 CFR 63 Subpart DDDDD.

ID	**BACT**	**Limits** (lb/MM BTU)		**Averaging**
		Natural Gas	Fuel Gas	
EQT0001	1 + 2 + 3	0.0027	0.0036	3 one-hour
EQT0002	1 + 2	0.0027	0.0047	3 one-hour
EQT0003 – EQT0005	1 + 2 + 3	0.0027	-	3 one-hour
EQT0006	2 + 3	0.0054	-	Annual

BACT FOR GREENHOUSE GAS EMISSIONS

The boiler and heaters are fuel combustion equipment. During the fuel combustion process, CO_2, CH_4, and N_2O emissions are produced. If a boiler or heater is properly tuned, 99.9% of the fuel carbon in natural gas is converted to CO_2 during the combustion process. This conversion barely depends on boiler or combustor type. The 0.1% of fuel carbon that is not converted to CO_2 results in CH_4, CO, and/or VOC emissions and is due to incomplete combustion. However, even in boilers operating with poor combustion efficiency, the amount of CH_4, CO, and VOC produced is insignificant compared to CO_2 levels.

Formation of N_2O during the combustion process is affected by two combustion process factors: combustion temperature and excess oxygen level. When the combustion temperature is high (above 1475°F) and excess oxygen is low (< 1 vol%), minimal N_2O emissions are generated. Otherwise, the formation of N_2O increases. Methane emissions are also affected by the combustion temperature. Low-temperature combustion will produce high levels of methane emissions. In addition, incomplete combustion also increases methane emissions. Thus, methane emissions are high during the start-up and shut-down cycle of boilers. Typically, conditions that promote formation of N_2O also benefit emissions of methane.

Step 1 – Identify All Control Technologies

1. Use of Low Carbon Gaseous Fuel;
2. Good Operating and Maintenance (O&M) Practices;
3. Efficiency Improvement Measures; and
4. Carbon Capture and Sequestration/Storage.

Step 2 – Eliminate Technically Infeasible Options

Use of Low Carbon Gaseous Fuel

Natural gas or other low sulfur off-gas are among the lowest carbon intensity fuels available for the heaters and boiler. The proposed boiler and heaters will be fired with only natural gas and off-gas fuels that contain significant amounts of hydrogen. As a result, GHG emissions are reduced.

Good Operating and Maintenance (O&M) Practices

Good combustion and operating practices with routine burner tune-ups can reduce GHG emissions by improving the fuel efficiency of the boilers and heaters. Combustion of less fuel results in reduction of GHG emissions.

Efficiency Improvement Measures

Efficient boiler and heater design and proper air-fuel ratio improve fuel mixing and promote more efficient heat transfer. Measures to improve boiler efficiency will be included in their design, such as installation of heat recovery equipment, boiler blowdown minimization and heat recovery, boiler feed water preparation, insulation, full collection, and recycle and reuse of steam condensate.

Carbon Capture and Sequestration/Storage (CCS)

CCS requires three separate and distinct steps. If any one of the three CCS steps is unavailable or technically infeasible, CCS is not viable as BACT.

Step 1: Separating and capturing CO_2 from a combustion unit's exhaust gas;
Step 2: Pressurizing and transporting the captured CO_2 for injection; and
Step 3: Injecting the CO_2 into an available and permanent geologic storage structure.

Step 1: Separate and Capture of CO_2

There are three different types of CO_2 capture systems: post-combustion, pre-combustion, and oxyfuel combustion. The important factors to select the appropriate CO_2 capture system are the concentration of CO_2 in the gas stream, the pressure of the gas stream, and the fuel type (solid or fuel).

Post-combustion Capture: A post-combustion capture system separates CO_2 from the flue gases produced by the combustion of the primary fuel in air. Typically, these systems use a liquid solvent to capture the small fraction of CO_2 (3 percent by volume to 15 percent by volume) present in the flue gas stream in which the main constituent is nitrogen. These systems typically use an organic solvent such as monoethanolamine (MEA) to separate CO_2 from the flue gas stream.[4]

Pre-combustion Capture: The first stage of a pre-combustion capture process reaction produces a mixture of hydrogen and carbon monoxide (syngas) from the primary fuel. This reaction can be achieved by either "steam reforming" or "partial oxidation" based on the primary fuel (gaseous, solid, or liquid). CO_2 is removed from the CO/H_2 mixture by the "shift" reaction by the addition of steam (waste gas shift reaction).[5]

Oxy-combustion Capture: The oxy-fuel combustion process eliminates nitrogen from the flue gas by combusting a hydrocarbon or carbonaceous fuel in either pure oxygen or a mixture of pure oxygen and a CO_2-rich recycled flue gas. The flue gas consists mainly of CO_2 and water vapor together with excess oxygen required to ensure complete combustion of the fuel. The flue gas, after cooling to condense water vapor, contains about 80 percent to 98 percent CO_2 depending on the fuel used. This concentrated CO_2 stream can be compressed, dried, and further purified before delivery into a pipeline for storage.[6]

Step 2: Pressurize and Transport of CO_2

CO_2 can be transported in three states: gas, liquid, and solid. Typically, commercial-scale transport uses tanks, pipelines, and ships for gaseous and liquid CO_2. Gaseous CO_2 transported at atmospheric pressure occupies a large volume. Therefore, gaseous CO_2 must be compressed, and compressed CO_2 is then transported by pipeline. The volume of CO_2 can be further reduced by liquefaction, solidification, or hydration for transportation.

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[4] Intergovernmental Panel on Climate Change, "Carbon Dioxide Capture and Storage", 2005, p. 25. Available at https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf. Accessed July 2022.

[5] *Ibid.*

[6] *Ibid.*

Step 3: Storage of CO_2

CO_2 storage potentially can be accomplished by the following methods:

a. Underground geological storage;
b. Ocean storage;
c. Mineral carbonation; and
d. Industrial uses such as Enhanced Oil Recovery (EOR).

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

1. Carbon Capture and Sequestration/Storage (CCS);
2. Use of Low Carbon Gaseous Fuel;
3. Good Operating and Maintenance (O&M) Practices; and
4. Efficiency Improvement Measures.

Step 4 – Evaluate Most Effective Controls

Carbon Capture and Sequestration/Storage (CCS)

CCS is the top control measure for all the GHG-emitting emission points. However, the economic analysis indicate that CCS is not cost-effective for this project. Thus, it is not considered as BACT for GHG emission control. See Table I (BACT Cost Summary).

Step 5 – Select BACT

A combination of the use of low carbon intensity gaseous fuels, good combustion and operating practices, incorporation of high energy recovery from flue gas, and pollution prevention by improving energy efficiency is selected as BACT to reduce GHGs emissions from the proposed boiler and heaters,

- Use of low carbon intensity gaseous fuels: Natural gas for EQT0003, EQT0004, EQT0005, and EQT0006 and natural gas and/or fuel gas for EQT0001and EQT0002.
- Good combustion and operating practices:
  - Sufficient residence time to guarantee efficient operation;
  - Properly controlled excess air and sufficient turbulence to support the optimum combustion conditions and combustion control systems to optimize the oxygen and air flow to maximize fuel efficiency; and
  - Maintenance of all equipment according to manufacturer's recommended operations and maintenance practices.
- Efficiency improvement measures:
  - EQT0003, EQT0004, EQT0005, and EQT0006: Compliance with 40 CFR 63 Subpart DDDDD, including burner tune-up every five years;
  - EQT0002: Burner tune-up every five years;
  - Feed water economizers and combustion air pre-heaters;

- Boiler makeup water treated to remove dissolved solids to minimize boiler blow down;
- Condensate system to recover and return condensate to the boiler feed water;
- Heat recovery from boiler blow down to pre-heat boiler feed water and use of boiler blow down steam for low pressure steam needs;
- Insulation of boiler and process heaters and piping to reduce heat loss; and
- Reduction of standby losses by use of proper design and manufacturer's operating specifications for stable operation during the targeted operating range.

Formalin Plant Thermal Oxidizer - B5701 (EQT0007)
MMA Plant Thermal Oxidizer - L7402 (EQT0008)

Thermal oxidizers are proposed as control device for process vents, storage tanks, and startup/shutdown releases. Thermal oxidizers control emissions through combustion. Due to the combustion process employed, criteria pollutants (NO_X, CO, and PM) will be emitted due to combustion of waste gases and pilot gas. Small amount of VOCs/HAPs will also be released due to incomplete destruction of the waste gases and streams.

Step 1 – Identify All Control Technologies

1. Good Process Design;
2. Use of Natural Gas;
3. Best Operational Practices;
4. Good Thermal Oxidizer Design;
5. SCR / SNCR for NO_X Emission Control; and
6. Baghouses for $PM_{10}/PM_{2.5}$ Emission Control.

Step 2 – Eliminate Technically Infeasible Options

EQT0007: $PM_{10}/PM_{2.5}$ emissions are relatively low (0.80 lbs/hr); therefore, add-on controls, such as baghouses, are not practical.

EQT0008: SCRs are considered technical infeasible due to the risk of poisoning the catalyst by impurities in the flue gas stream.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

1. Good practices to minimize the combustion emissions;
2. Good process/equipment design (to minimize the volume of waste gases to be controlled by the thermal oxidizers);
3. Use of natural gas (as supplemental fuel when needed to ensure good combustion);
4. Best operational practices (such as continuous combustion chamber temperature monitoring, gas flow measurement, and gas heating value measurement/control);
5. Determine minimum temperature required for the proposed destruction efficiency during the initial performance demonstration;
6. Baghouses for $PM_{10}/PM_{2.5}$ emissions from EQT0008.

ID	Operation	BACT	Limits
EQT0007 - NOx	Normal	LNB + (SNCR or FGR)	0.035 lbs/MM BTU
EQT0007 - NOx	Maintenance, 36 hrs/yr	LNB	0.07 lbs/MM BTU
EQT0008 - $PM_{10}/PM_{2.5}$	(All year)	Baghouses	-
EQT0008 - NOx	Normal	LNB + (SNCR or FGR)	0.055 lbs/MM BTU
EQT0008 - NOx	Maintenance, 36 hrs/yr	LNB	0.15 lbs/MM BTU

Cooling Tower - L7201 (EQT0010)

BACT FOR $PM_{10}/PM_{2.5}$ EMISSIONS

Evaporative cooling towers cool water by evaporating some of the water through direct contact with air, i.e., the units exchange heat between water and air in the form of latent heat of water vaporization. This type of cooling tower typically employs a wetted medium. In order to promote evaporation, the units provide a large surface area and/or create many water droplets with a large cumulative surface area. Consequently, the forced ambient air flow caries aerosol droplets or "drift" from the top of the cooling tower. Due to the dissolved solids in water, the cooling tower spray drift can result in particulate matter emissions when the liquid is evaporated.

Drift fraction and concentration of total dissolved solids (TDS) in water are two important factors affecting the $PM_{10}/PM_{2.5}$ emissions. The concentration of total dissolved solids in cooling water varies from site to site and is dependent on the water source and concentration cycles. Drift eliminators of different types have been commonly used to reduce the amount of water drift. The $PM_{10}/PM_{2.5}$ emissions, therefore, are reduced.

Step 1 – Identify All Control Technologies

1. High Efficiency Drift Eliminator;
2. Limiting TDS in the Recirculation Water; and
3. Proper Equipment Design, Operation, and Maintenance.

Step 2 – Eliminate Technically Infeasible Options

High Efficiency Drift Eliminator

Baffle-like drift eliminators can be incorporated into the tower design to remove as many droplets as practical from the air stream before it exits the tower. Drift eliminators rely on inertial separation caused by direction changes as air passes through the eliminator. Using a high efficiency drift eliminator is a common technology for reducing particulate matter emissions from cooling towers.

Limiting TDS in the Recirculation Water

Monitoring of water chemistry will ensure that TDS remain at or below acceptable levels. By maintaining a low level of TDS in the circulating cooling water, the amount of particulate matter generated by drift can be minimized.

Proper Equipment Design, Operation, and Maintenance

Proper equipment design, operation, and maintenance, together with TDS concentration limitation, are essentially free, base case technologies.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

High efficiency mist/drift eliminators with a drift rate of <= 0.0005% and a TDS limit of 1505 ppmw (annual average) are determined as BACT for $PM_{10}/PM_{2.5}$ emissions. In addition, the cooling tower shall be maintained as recommended by the manufacturer.

BACT FOR VOC EMISSIONS

When water from a cooling tower is used to cool streams containing VOCs, leaks can occur in the heat exchanger tubes allowing VOCs to leak into the cooling water stream if the stream containing the VOC is at higher pressure than the cooling water. The VOCs that leak into the cooling water get stripped from the cooling water when it returns to the cooling tower and is contacted with air. During normal conditions, there will be no VOC emissions from cooling towers.

Steps 1 through 5

VOC emissions from the cooling tower are due to the heat exchanger leaks. The only identified control technology used to reduce VOC emissions from wet cooling towers is leak detection and repair (LDAR) programs.

Cooling Tower L7201 is subject to 40 CFR 63 Subpart F – National Emission Standards for Organic Hazardous Air Pollutants (NESHAP) from the Synthetic Organic Chemical Manufacturing Industry (SOCMI). Compliance with all applicable provisions in 40 CFR 63 Subpart F is determined as BACT for VOC emissions from Cooling Tower L7201.

Storage Tanks (EQT0013 – EQT0017 and EQT0019 – EQT0035)

Routine emissions from fixed roof storage tanks include standing losses and working losses. Standing losses result from the daily cycle of warming and cooling of the vapor space due to heat exchange between the vapor space and ambient air through the shell and roof of the tank. This heat exchange causes daytime expansion and nighttime contraction of vapors in the vapor space. Each daytime expansion causes a part of the vapors to be discharged from the vapor space. Working losses result from vapor venting during tank-filling operations.

Step 1 – Identify All Control Technologies

1. Painted White on the Exterior;
2. Submerged Fill Lines;
3. Fixed Roof Tanks;
4. Floating Roof (Internal or External) Tanks; and
5. Closed Vent System Followed by Add-On Controls.

Step 2 – Eliminate Technically Infeasible Options

The control technologies identified above are technically feasible and applicable depending on the size of tank and the vapor pressure of the material in the tanks.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The organic liquid-containing tanks to be installed in the CO, methanol, formalin, and MMA plants will be subject to 40 CFR 63 Subpart G. Subpart G requires control of the tanks, and the control options allowed are generally the top-ranked control technologies available for tank emission control (i.e., floating roofs or closed vent system to a control device).

Step 4 – Evaluate Most Effective Controls

BACT for VOC emissions from storage tanks in most cases is the most stringent NSPS, NESHAP, or SIP standard applicable to the specific tank. If the tank is subject to Subpart G (HON), for example, BACT is proposed as compliance with all the applicable requirements of that subpart. The NESHAP standards are established at levels reflective of Maximum Achievable Control Technology or MACT. The NESHAP considers devices such as internal and external floating roofs meeting the standards to be equivalent in control effectiveness to fixed roof tanks using closed vent systems and control devices.

There are certain tanks, which are exempt from control requirements under NSPS, NESHAP, and the SIP rule, generally due to having low vapor pressure and/or small size. The EPA has determined through rulemaking that control is not feasible for such sources. Generally, the standard for these tanks is keeping records to ensure that the materials stored meet exemption thresholds, along with best practical housekeeping and maintenance practices to minimize VOC emissions.

Step 5 – Select BACT

The tanks will be controlled either by fixed roofs or fixed roofs in combination with a closed vent system and thermal oxidizer and/or a flare as listed in Table IV of this permit.

Diesel Emergency Generator L7901 (EQT0012)

The diesel engine will emit criteria pollutants due to diesel combustion. The emergency diesel engine will be limited to 100 hours per year of operation under nonemergency situations for required testing and maintenance and will meet the definition of "emergency stationary internal combustion engine" under 40 CFR 60 Subpart IIII and 40 CFR 63 Subpart ZZZZ. The fuel used will be limited to low sulfur diesel (< 15 ppmw sulfur).

BACT FOR $PM_{10}/PM_{2.5}$ EMISSIONS

Step 1 – Identify All Control Technologies

1. Proper Engine Design and Good Combustion Practices;
2. Use of Clean, Low Sulfur Diesel Fuel;
3. Limit Hours of Non-Emergency Operation; and
4. Catalyzed Diesel Particulate Filter (CDPF).

Step 2 – Eliminate Technically Infeasible Options

Add-on control technology (CDPF) is not technically feasible since the catalyst cannot function well to reduce PM emissions due to the short operating period for each event.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The technically feasible $PM_{10}/PM_{2.5}$ control technologies include:

- Limit Hours of Non-Emergency Operation;
- Proper Engine Design and Good Combustion Practices; and
- Use of Clean, Low Sulfur Diesel Fuel.

These technologies have varying levels of control depending upon the engines to which they are applied. The combination of all the measures above will minimize particulate matter emissions from the emergency generator diesel engine.

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The following measures are determined as BACT for $PM_{10}/PM_{2.5}$ emissions from the diesel emergency generator:

- Limit non-emergency operation to no more than 100 hours per year;
- Proper engine design and good combustion practices;
- Use of clean, low sulfur diesel fuel; and
- Compliance with 40 CFR 60, Subpart IIII ($PM_{10}/PM_{2.5}$ <= 0.15 g/hp-hr).

BACT FOR NOx EMISSIONS

Step 1 – Identify All Control Technologies

1. Selective Catalytic Reduction (SCR);
2. Selective Non-Catalytic Reduction (SNCR);
3. Non-Selective Catalytic Reduction (NSCR);
4. EMx^{TM};
5. Low Emission Combustion (ignition timing retard and air-to-fuel ratio adjustment);
6. Proper Engine Design and Good Combustion Practices;
7. Use of Clean, Low Sulfur Diesel Fuel; and
8. Limit Hours of Non-Emergency Operation.

Step 2 – Eliminate Technically Infeasible Options

Add-on controls for NO_X emissions from the emergency generator engine are not technically feasible since the catalyst or the reagent cannot function well to reduce NO_X emissions due to the short operating period for each event. The emergency engine will be operated for no more than 100 hours in non-emergency service. To ensure that the engine is in good working order, each week the engine will be operated for short periods of time to conduct readiness tests. The short duration of the operation does not provide adequate time for the exhaust gas to come to the required operating temperature for a SCR or a reagent to effectively reduce NO_X emissions. Therefore, add-on control technologies are not considered technically feasible and are not considered further in this analysis.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Emergency engines that comply with 40 CFR 60 Subpart IIII typically include the technically feasible control technologies listed below:

1. Low emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
2. Proper engine design and good combustion practices;
3. Use of clean, low sulfur diesel;
4. Limit hours of non-emergency operation; and
5. Compliance with 40 CFR 60 Subpart IIII.

These technologies have varying levels of control depending upon the engines to which they are applied. The combination of all the measures above will minimize NOx emissions from the emergency generator.

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The emergency diesel engine is subject to NSPS Subpart IIII and MACT Subpart ZZZZ. The emission rates contained in NSPS Subpart IIII set the floor for BACT for the emergency engine. Therefore, the following measures are selected as BACT for NOx emissions from the diesel emergency generator:

1. Low emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
2. Proper engine design and good combustion practices;
3. Use of clean, low sulfur diesel;
4. Limit non-emergency operation to no more than 100 hours per year; and
5. Compliance with 40 CFR 60 Subpart IIII (NMHC + NOx <= 4.8 g/hp-hr).

BACT FOR CO EMISSIONS

Step 1 – Identify All Control Technologies

1. Oxidation Catalyst;
2. EMx™;
3. Low-Emission Combustion (ignition timing retard and air-to-fuel ratio adjustment);
4. Proper Equipment Design and Good Combustion Practices;
5. Use of Clean, Low Sulfur Diesel Fuel; and
6. Limit Hours of Non-Emergency Operation.

Step 2 – Eliminate Technically Infeasible Options

Oxidation Catalyst

In order to be effective, the catalyst must reach a proper operating temperature of 600°F to 800°F. The project's diesel engine will operate intermittently and for short duration at low loads for testing and maintenance and infrequently in the event of power outage. For this mode of operation, because the flue gas temperature usually does not reach the temperature range where the catalyst effectively reduces CO emissions, the catalyst will not function well. Therefore, catalytic oxidation is not technically feasible.

EMx^{TM}

In order to be effective, the catalyst operates most effectively within temperature range of 300°F to 700°F. As described above, the project's diesel engine will not run continuously, but will only run for less than one hour per week for testing and maintenance. In such a short period of time, because the flue gas temperature does not reach the normal working temperature range of the catalyst, the catalyst cannot effectively reduce carbon monoxide emissions. Therefore, EMx^{TM} is not technically feasible.

Limit Hours of Operation

The diesel engines will only be used during emergency situations. For normal operations, the annual hours of operation will be limited to routine testing and maintenance that will substantially limit emissions.

Low-Emission Combustion

Low-emission combustion in diesel engines involves parametric controls and combustion design considerations. Parametric controls include adjusting the ignition timing and air-to-fuel (A/F) ratio. Combustion design includes optimizing the combustion chamber design and enhancing the air-fuel mixing to achieve proper ignition and stable combustion.

Proper Equipment Design and Good Combustion Practices

Good combustion practices, including proper maintenance and operation of the emergency diesel engine, minimizes pollutant formation and supports efficient operation.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Emergency engines that comply with 40 CFR 60 Subpart IIII typically include the technically feasible control technologies listed below:

1. Low-emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
2. Proper equipment design and good combustion practices;
3. Use of clean, low sulfur diesel;
4. Limit hours of non-emergency operation; and
5. Compliance with 40 CFR 60 Subpart IIII (CO <= 2.6 g/hp-hr).

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The following measures are selected as BACT for CO emissions:

1. Low-emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
2. Proper equipment design and good combustion practices;
3. Use of clean, low sulfur diesel;
4. Limit non-emergency operation to no more than 100 hours per year; and
5. Compliance with 40 CFR 60 Subpart IIII (CO <= 2.6 g/hp-hr).

BACT FOR VOC EMISSIONS

Step 1 – Identify All Control Technologies

1. Oxidation Catalyst;
2. EMx™;
3. Low-Emission Combustion (ignition timing retard and air-to-fuel ratio adjustment);
4. Proper Equipment Design and Good Combustion Practices;
5. Use of Clean, Low Sulfur Diesel Fuel; and
6. Limit Hours of Non-Emergency Operation.

Step 2 – Eliminate Technically Infeasible Options

The add-on control technologies require the flue gas temperature to be within a certain range to effectively reduce emissions. Due to the operating mode of the emergency diesel engine (intermittent and short duration), the catalyst cannot function well and cannot reduce VOC emissions effectively. Therefore, add-on control technologies are technically infeasible to control VOC emissions from the emergency diesel engine.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Emergency engines that comply with 40 CFR 60 Subpart IIII typically include the technically feasible control technologies listed below:

1. Low-emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
2. Proper equipment design and good combustion practices;
3. Use of clean, low sulfur diesel;
4. Limit hours of non-emergency operation; and
5. Compliance with 40 CFR 60 Subpart IIII (NOx + NMHC <= 4.8 g/hp-hr).

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The following measures are selected as BACT for VOC emissions:

1. Limit non-emergency operation to no more than 100 hours per year;
2. Proper equipment design and good combustion practices;
3. Low-emission combustion (ignition timing retard and air-to-fuel ratio adjustment);
4. Use of clean, low sulfur diesel fuel; and
5. Compliance with 40 CFR 60 Subpart IIII (NOx+ NMHC <= 4.8 g/hp-hr).

BACT FOR GREENHOUSE GAS EMISSIONS

Step 1 – Identify All Control Technologies

1. Proper Equipment Design and Good Combustion Practices;
2. Carbon Capture and Sequestration/Storage (CCS);
3. Combust Low Carbon Fuel; and
4. Limit Hours of Non-Emergency Operation.

Step 2 – Eliminate Technically Infeasible Options

Low Carbon Fuels

Natural gas has the lowest carbon content of all common fossil fuels. For each unit of energy content, natural gas contains approximately 28 percent less carbon than diesel fuel and 45 percent less carbon than coal. The purpose of the emergency generator is to provide power during emergency situations, such as hurricanes. During these periods, purchased power may not be available from a local utility firm, and the electrical generating capacity of the plant itself may be constrained if a spark-ignition engine used as emergency generator since natural gas may not be sufficiently available in the event of an emergency. Use of natural gas is also a concern due to its volatility, as it would be a possible ignition source during an emergency situation. Therefore, use of natural gas as fuel for emergency generator is technically infeasible, and ULSD is the lowest carbon alternative.

Proper Equipment Design and Good Combustion Practices

Proper engine design and good combustion practices enable the engine to run thermally efficient, thereby providing the greatest output per unit of fuel consumed and producing low GHG emissions per unit of output. The diesel engine to be installed by MCA will be designed thermally efficient. MCA will maintain and operate the engine properly according to manufacturer's procedures.

Limit Hours of Operation

The emergency generator will only operate in the event of an emergency. For normal operations, the operating time will be limited to 100 hours per year for routine testing and maintenance. This operating requirement will greatly limit emissions.

CCS

The economic analysis indicates that CCS is not economically feasible. Therefore, CCS is not considered further in this analysis.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Proper engine design and good combustion practices, an operating time usage limitation, and exclusive use of ULSD as fuel are considered technically feasible technologies to control GHG emissions from emergency diesel engines. A combination of these controls will provide the most effective reduction of GHG emissions.

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The following measures are selected as BACT for GHG emissions from the diesel emergency engine:

1. Limit non-emergency operation to no more than 100 hours per year;
2. Proper equipment design and good combustion practices;
3. Use of ultra low sulfur diesel (ULSD) as fuel; and
4. Compliance with 40 CFR 60, Subpart IIII to limit CO_2e <= 1.16 lbs/hp-hr.

Combined Flare H7401 (EQT0009)

The flare will be used as a control device to reduce emissions of VOC and HAPs. The flare will emit criteria pollutants ($PM_{10}/PM_{2.5}$, NOx, CO, and VOC) and GHG due to combustion of waste gases and pilot gas. A small amount of VOCs/HAPs will also be released due to incomplete destruction of the waste gases.

Step 1 – Identify All Control Technologies

1. Use of Natural Gas for Pilot Gas;
2. Flare Minimization; and
3. Proper Flare Design and Good Combustion Practices.

Step 2 – Eliminate Technically Infeasible Options

The identified control technologies are typical good work practices, and all of them are technically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

Use of natural gas for pilot gas, minimization of flare gas, and proper flare design and good combustion practices are selected as BACT for $PM_{10}/PM_{2.5}$, NOx, CO, VOC, and GHG emissions. Mitsubishi shall demonstrate proper flare design and good combustion practices by complying with 40 CFR 63.670 and 63.671 as prescribed in 40 CFR 63.108(a).

Wastewater Treatment Plant (EQT0011)

The Wastewater Treatment Plant (WWTP) will receive and combine four (4) wastewater streams prior to treatment. VOC will emitted from a buffer tank, splitter box, four moving bed bioreactors (MBBRs), two dissolved air flotation (DAF) units, a waste solids holding tank, a centrate collection tank, an effluent monitoring tank, and sludge dewatering and chemical injection activities. These wastewater streams/tanks are classified as Group 2 wastewater streams/tanks under 40 CFR 63 Subpart G, which requires various monitoring and recordkeeping requirements.

Step 1 – Identify All Control Technologies for Wastewater Tanks

1. Submerged Fill Pipes;
2. Fixed Roofs;
3. Floating Roofs;
4. Closed Vent System and Control Devices;
5. Compliance with monitoring and recordkeeping requirements of 40 CFR 63 Subpart G.

Step 2 – Eliminate Technically Infeasible Options

Due to low VOC emission rates (<= 0.20 lbs/hour), all the control options are deemed impractical.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

Compliance with monitoring and recordkeeping requirements of 40 CFR 63 Subpart G is determined as BACT.

Process Vents

BACT FOR VOC EMISSIONS

Step 1 – Identify All Control Technologies

1. Flare;
2. Thermal Oxidizer or Vapor Combustor;
3. Boiler or Process Heater;
4. Carbon Canister; and
5. Compliance with Requirements of 40 CFR 63 Subpart G.

Step 2 – Eliminate Technically Infeasible Options

The identified control technologies are technically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Control Technology	Control Efficiency (%)
Thermal Oxidizer or Vapor Combustor	99+
Boiler or Process Heater	98
Flare	98
Carbon Canister (Adsorption)	95
Compliance with Requirements of 40 CFR 63 Subpart G	-

Thermal Oxidizer or Vapor Combustor

In regenerative oxidation, the inlet gas stream is drawn through a hot ceramic or stoneware bed that preheats the gas stream prior to its entering the combustion chamber. The hot flue gas exits the oxidizer and passes into a second ceramic bed, which captures and stores thermal energy. When this bed has been heated sufficiently, the flow is switched so that the inlet gas is now redirected through the hot bed, and the exhaust gas is passed through the now cool primary bed. By switching flows in this manner, high heat exchanger temperatures are maintained. Aside from the ceramic media heat exchanger, regenerative systems operate in the same manner as conventional thermal oxidization. Regenerative oxidizers provide a high degree of thermal heat recovery and are useful for situations where the air flowrate is high and VOC concentration is low. In these cases, a significant amount of heat recovery is required to minimize overall system operating costs. Costs can be high because of the capital investments and supplemental fuel along with other operating costs.

Boiler or Process Heater

Process vent gases can be controlled by a boiler or process heater or used as fuel in combustion equipment, such as boilers, furnaces, process heaters, and turbines. Process vent gases may be used alone or in combination with other sources of gas. When the process vent gases are used as fuel, the VOCs in the vent gases are destroyed, and the destruction efficiency may reach 98% or higher. Some regulations require the vent gas streams be introduced to the flame zone of the boiler or process heater.

Flare

Flares can be used to burn waste gases containing combustible compounds such as VOCs, natural gas, carbon monoxide, and hydrogen. The flares are equipped with a specially designed burner tip. Auxiliary fuel, and, in some cases, assist gases like steam or air are used to promote mixing for nearly complete (e.g., ≥ 98%) destruction of the combustible components in the waste gas. Flares typically operate with pilot flames to provide the ignition source, and they use ambient air as the oxidizing agent. The waste gases to be flared typically provide the fuel necessary for combustion. Completeness of combustion in a flare is governed by flame temperature, residence time and flammability of the gas in the combustion zone, turbulent mixing of the components to complete the oxidation reaction, and available oxygen for free radical formation.

Flaring process can produce some undesirable by-products, including noise, smoke, heat radiation, light, sulfur oxides (SO_X), nitrogen oxides (NO_x), and CO, and can be an undesirable potential source of ignition. However, by proper design, these undesirable impacts can be minimized.

Carbon Canister (Adsorption)

Adsorption is a process where VOCs are removed from low to medium concentration gas streams. The gas molecules pass through a bed of solid particles such as activated carbon, which is the most widely used adsorbent. The molecules are held to the adsorbent by attractive forces that are weaker than chemical bonds.

For an adsorption process, there is a limit to the mass of pollutants that can be collected by an adsorbent. When the limit is reached, the adsorbent is no longer effective in removing the pollutant. To recover the ability to capture gaseous pollutants, adsorbents typically are regenerated, i.e., the pollutant is desorbed (removed) from the adsorbent. A typical working capacity is 10-20 pounds of contaminant per 100 pounds of carbon.

Adsorption systems are usually limited to sources generating organic compounds having a molecular weight of more than 50 and less than approximately 200. Low molecular weight organics usually do not adsorb sufficiently, while high molecular weight compounds adsorb so strongly that it is difficult to remove these materials from the adsorbent during the desorption process.

Compliance with Requirements of 40 CFR 63 Subpart G

Some process vents have low VOC concentrations or low flow rates. They are not subject to any federal or state regulations or are exempt from the control requirements in the applicable rules, such as Group 2 process vents under 40 CFR 63 Subpart G. In such situations, BACT is determined as compliance with the monitoring, recordkeeping, and/or reporting requirements in the applicable rules.

Step 4 – Evaluate Most Effective Controls

1. Thermal Oxidizer or Vapor Combustor;
2. Boiler or Process Heater;
3. Flare; and
4. Compliance with Requirements of 40 CFR 63 Subpart G.

Step 5 – Select BACT

Process Vent	**Control Technology and VOC Removal Efficiency**	
	Primary	Secondary/Alternate
Formalin Plant Tail Gas	Formalin Thermal Oxidizer ≥ 99.9%	Flare ≥ 98%
MMA Plant Vents	MMA Plant Thermal Oxidizer ≥ 99.99%	Flare ≥ 98%
CO MeOH Plant Vents	Boiler B6109 ≥ 98% (VOC emissions ≤ 0.0036 lb/MM BTU)	Heater B6101 ≥ 98% (VOC emissions ≤ 0.0047 lb/MM BTU)

BACT FOR CO AND GHG EMISSIONS

The process vent gas streams contain residual CO and CO_2 after the production process. The vent streams from the CO plant and methanol plant will be routed to the fuel gas system and used as fuel for the CO MeOH Auxiliary Boiler and CO MeOH Fired Heater. The Formalin Plant and the MMA Plant process vents will be controlled by the Formalin Plant Thermal Oxidizer and the MMA Plant Thermal Oxidizer, respectively. Since the vent streams will be routed to the fuel gas system to be used as fuel or controlled by the thermal oxidizers and the flare when the thermal oxidizers undergo maintenance, the CO in the streams will be destroyed at high efficiency. The technology and process employed by MCA will minimize the amount of CO_2 generated in the production process. Therefore, proper process design and operation is BACT for controlling the CO_2 in the process vent streams.

Plant Road Fugitives (FUG0002)

The following identified potential control options are best management practices (BMPs) and are considered in determining BACT for the in-plant haul roads:

- Posting and limiting vehicle speeds;
- Water spray/road washing;
- Chemical stabilization;
- Sweeping; and
- Combination of the controls identified above.

Step 2 – Eliminate Technically Infeasible Options

All the identified BMPs are technically feasible, except for chemical stabilization, which is used for unpaved roads. Limiting the travelling speed will reduce particulate matter emissions since particulate matter emissions due to truck traveling are related directly to the average speed of the vehicles.

Water spray/road washing is effective in reducing particulate matter emissions since total road surface dust loading is decreased. However, water spray and road washing may cause water pollution and requires water trucks to carry the water and do the work, with emissions from the water trucks offsetting some of the benefits. Water spray is typically used more for unpaved roads than for paved roads. Therefore, water spray and road washing will not be considered as BACT for plant road particulate matter emissions.

Sweeping reduces particulate matter emissions by collecting and minimizing the loose materials that have deposited on road surface (total road surface dust loading). Road sweeping is effective for roads with heavy traffic and where loose material may spill. Traffic at the proposed facility will be very low, and the vehicles will not be used to transport loose materials. Therefore, sweeping will not be effective in reducing the particulate emissions from the plant roads and will not be discussed further.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

(NA)

Step 4 – Evaluate Most Effective Controls

(NA)

Step 5 – Select BACT

- Paving of all in-plant haul roads;
- Post and limit the maximum traveling speed to 10 mph; and
- Compliance with LAC 33:III.1305.

BACT FOR FUGITIVE VOC EMISSIONS

Fugitive emissions are those emissions that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening. The emissions from leaking piping components are considered fugitive emissions. The fugitive components generally regulated by NSPS and NESHAP rules include pumps, valves, compressors, pressure relief devices, sampling connections, open ended valves and lines, flanges (connectors), instrumentation systems, hatches, and agitators.

This project will install pipes to transport gaseous and liquid raw materials and products/coproducts between different units. The project will also have pipes to transport natural gas to boilers/process heaters/combustion control devices to facilitate their operation. Consequently, calculated fugitive emissions from piping components are 17.88 tpy of VOC, 52 tons/year of GHG, and 4.69 tons/year of CO.

Step 1 – Identify All Control Technologies

Potential applicable control technologies for equipment leaks include the following design or work practice programs:

1. Use of leakless technologies for some components;
2. Employment of a LDAR program with instrument sensors (Method 21) along with established federal or state regulatory requirements for fugitive components, identification, monitoring schedule determination, repair deadline instruction, as well as recordkeeping and reporting requirements;
3. Application of an alternative monitoring program using remote sensing technology such as an infrared camera along with requirements for repair deadlines and appropriate recordkeeping and reporting;
4. Use of an LDAR program using routine inspections via audio/visual/olfactory (AVO) means instead of instrument detection to identify leaks and repair them promptly, coupled with appropriate recordkeeping and reporting; and
5. Designing and constructing facilities with high quality components and materials compatible with the process.

Step 2 – Eliminate Technically Infeasible Options

<u>Leakless Technologies</u>

Leakless valves and sealless pumps are available and currently in use, primarily where highly toxic or otherwise hazardous materials are used. These technologies are generally considered cost prohibitive except for specialized service.

Leakless valves are not available in all sizes and types. In addition, like any other piece of mechanical equipment, leakless components can fail. In such circumstances, they are usually not repairable online and may leak until the next unit shutdown. For these reasons, leakless valves are not considered technically feasible.

For pumps, double (or dual) mechanical seals are designed to ensure maximum sealing safety. These seals eliminate leakage of the fluid being handled and provide a level of safety/zero emissions that cannot be achieved with a single seal. Sealless pumps are typically used when the fluid and its vapors are hazardous to the operator or environment, the fluid is corrosive, or the liquid contains abrasives. Sealless pumps are available for different applications and are considered technically feasible.

<u>LDAR Program Employing Method 21</u>

Fugitive emissions may be minimized by implementing an LDAR program utilizing Method 21 of 40 CFR 60 Appendix A to detect leaks. The primary purpose of an LDAR program is to identify unintentional equipment leaks and prescribe follow-up repairs. LDAR programs specify the components to be monitored, the frequency at which such components must be monitored, and the instrument reading that defines a leak; establish deadlines by which leaks must be repaired and re-monitored; and prescribe recordkeeping and reporting requirements.

Monitoring according to the most stringent applicable LDAR program will effectively reduce fugitive emissions from the plant. Application of LDAR is technically feasible.

<u>Remote Sensing Technology</u>

On April 6, 2006, the US EPA published a voluntary alternative work practice (AWP) in the Federal Register to allow use of infrared (IR) cameras to monitor fugitive components for leaks of VOC emissions. The rule was finalized in 2008. The AWP allows the use of optical scanning methods to detect leaks instead of vapor analyzers (a.k.a., sniffers) required by Method 21. Remote sensing technology has proven effective in identifying leaking components. To find the leaking component, monitoring using Method 21 is still needed.

The AWP has the following technical drawbacks:

- US EPA has not specified an explicit method to interpret and retain video records of inspections of every regulated component.
- As the IR camera is based on a video record only, no method exists to quantify identified leaks, as this method only detects the presence of the leak within a specified sensitivity level.
- IR cameras cannot reliably detect leaks less than 1,000 ppmv, and it is generally accepted that standard IR cameras will detect leakage only on the order of 10,000 ppmv and greater. Thus, this method cannot detect leaks at the leak thresholds, such as 500 ppmv, typically required by regulatory compliance programs.

Despite the above drawbacks, an IR camera is an option for reducing equipment leaks when the fugitive components are covered with insulation and leaks cannot be detected using Method 21.

AVO

AVO is an LDAR monitoring method involving visual inspections and observations (e.g., fluid dripping, spraying, etc. from or around components); sound (e.g., hissing); and odor. AVO monitoring is particularly effective for processes under high pressure or when compounds associated with the process in question have very low odor thresholds. It is not applicable to or does not work well if the fugitive piping components are in low pressure processes or in systems containing odorless material or material with high odor thresholds.

High-quality Components

High quality components designed for the specific service in which they are employed are a key element in the control of fugitive emissions. Fewer component failures can reduce fugitive emissions.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The technically feasible control technologies are ranked as follows:

- LDAR: Instrumental monitoring can effectively identify VOC leaks and is commonly used to control fugitive VOC emissions;
- AVO: The effectiveness of AVO in identifying leaks depends on the frequency of observations. When operating technicians patrol and inspect equipment during the routine tours of the operating areas, they may find leaks at high leak rates. AVO is not as effective as instrumental monitoring at identifying low leak rate leaks; and
- High-quality Components: Using high-quality components can effectively prevent VOC emissions compared to using low-quality components.

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

The following measures are determined as BACT to minimize fugitive VOC emissions:

- Use welded connections wherever possible;
- Use sealless pumps or pumps with double mechanical seals in organic service;
- Use rupture discs upstream of relief valves in organic HAP service that relieve to the atmosphere where required by the standards;
- Install flammable organics detectors in the operating area;

- Implement an appropriate LDAR program that meets requirements of 40 CFR 63 Subpart H, except that monitoring of connectors shall be in accordance with TCEQ 28LAER as described in the table below;
- Use IR camera to detect leaks in insulated fugitive components such as flanges and valves on a quarterly basis; and
- Establish a training program consistent with Section 7.2 of EPA's "Leak Detection and Repair: A Best Practices Guide" for Mitsubishi employees that perform Method 21 monitoring.

Program	**Monitoring requirement for connectors**
TCEQ 28LAER	• Initially at least quarterly; • Monitor semiannually if < 0.5% leaking for two consecutive quarterly monitoring periods; • Monitor annually if < 0.5% leaking for two consecutive semiannual monitoring periods.
40 CFR 63 Subpart H (for comparison)	• Initial monitoring; • Monitor annually if > 0.5% leaking; • Monitor biennially if < 0.5% leaking; • Monitor every 4 years if < 0.5% leaking for two consecutive years. • Heavy liquid connectors: monitor within 5 days of detection by sight, smell, or sound.

BACT FOR FUGITIVE GHG EMISSIONS

Step 1 – Identify All Control Technologies

Potential applicable control technologies for GHG equipment leaks include the followings:

- Proper Piping Design and Installations;
- Leak Detection and Repair (LDAR) Program;
- Alternative Monitoring Program; and
- AVO.

Step 2 – Eliminate Technically Infeasible Options

<u>Proper Piping Design and Installations</u>

Proper piping design and installations can include correct bracing, manual confirmation that all joints are tight, visual verification that all pipes are correctly assembled, proper piping design for required/desired pressure, correct seal design and selection, correct valve packing and O-rings installation, and manual inspection of disk gaskets installation on pressure relief devices. This control technology is technically feasible and is the basis for fugitive emission control.

Leak Detection and Repair (LDAR) Program

Fugitive emissions of GHG from the project are very low. An LDAR program is technically feasible for CH_4, but not for CO_2. Since CH_4 has a greater global warming potential than CO_2, instrumental monitoring of the fuel and feed systems for CH_4 would be an effective method to control GHG emissions.

Alternative Monitoring Program (AWP)

Remote sensing using infrared imaging has proven effective in identifying leaks, including CO_2 leaks. The process has been the subject of EPA rulemaking as an alternative monitoring method to the EPA's Method 21. Effectiveness may be comparable to EPA Method 21 when cost is included in the consideration.

AVO

Natural gas has an odor and can be detected in this manner. This control technology is technically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The technically feasible control technologies are ranked, from high to low control effectiveness, as follows: LDAR Program, AWP, and AVO.

Step 4 – Evaluate Most Effective Controls

No technologies were eliminated based on their energy, environmental, and/or economic impacts.

Step 5 – Select BACT

Proper piping design and installations and an LDAR program is BACT for fugitive GHG emissions from equipment leaks.

BACT FOR FUGITIVE CO EMISSIONS

Fugitive CO emissions result from leaking process equipment and piping components such as valves, flanges, connectors, etc. Carbon monoxide is an odorless inorganic gas. Good operating and maintenance practices are the only identified method of control for fugitive CO emissions from similar industries. Using welded connections wherever possible in combination with good operating and maintenance practices and continuous CO monitoring and detection in the operation area are determined as BACT for fugitive CO emissions.

COLLATERAL ENVIRONMENTAL IMPACTS

The potential of a control option to generate or reduce toxic and hazardous emissions, including compounds not regulated under the Clean Air Act, is considered as part of the environmental impacts analysis (in selecting BACT). According to EPA, a permitting authority should consider the effects of a given control alternative on emissions of toxics or hazardous pollutants not regulated under the Clean Air Act. The ability of a given control alternative to control releases of unregulated toxic or hazardous emissions must be evaluated and may, as appropriate, affect the BACT determination. Conversely, hazardous or toxic emissions resulting from a given control technology should also be considered and may, as appropriate, also affect the BACT determination.

In this case, the selection of selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR) as BACT for NO_X emissions results in emissions of ammonia. Ammonia is not regulated as a hazardous air pollutant under Section 112 of the Clean Air Act, but it is regulated as a toxic air pollutant (TAP) pursuant to LAC 33:III.Chapter 51, Louisiana's Comprehensive Toxic Air Pollutant Control Program. However, the impact of ammonia emissions will be below its ambient air standard (AAS) as set forth in Table 51.2 of LAC 33:III.5112. For this reason, ammonia emissions did not prohibit the selection of SCR or SNCR as BACT for NO_X.

B. AIR QUALITY ANALYSIS

LAC 33:III.509.M requires an analysis of ambient air quality in the area that a major stationary source would affect. Such analysis is required for each pollutant for which the source will have the potential to emit in a significant amount. For MCA Geismar Site, these pollutants include:

- particulate matter (PM_{10} and $PM_{2.5}$);
- nitrogen oxides (NO_X);
- carbon monoxide (CO);
- volatile organic compounds (VOC); and
- greenhouse gases (CO_2e).

There are no ambient air standards for CO_2e; therefore, this pollutant will not be discussed further in Sections B or C of this Preliminary Determination Summary.

Preconstruction Monitoring

In accordance with LAC 33:III.509.I.5.a, LDEQ may exempt a project from the requirements of LAC 33:III.509.M, with respect to monitoring for a particular pollutant, if the (net) emissions increase would cause, in any area, an air quality impact less than the significant monitoring concentration (SMC) for that pollutant. Preliminary screening indicates that maximum offsite ground level concentrations of emissions from the proposed facility will be less than the SMCs for all pollutants. Pre-construction monitoring is not required for any pollutants.

Pollutant	Averaging Period	Modeling Results ($\mu g/m^3$)	SMC ($\mu g/m^3$)	Preconstruction Monitoring
PM_{10}	Annual	2.16	10	Not Required
NO_2	Annual	0.34	14	Not Required
CO	8-hour	457.24	575	Not Required

C. SOURCE IMPACT ANALYSIS

LAC 33:III.509.K.1 requires a demonstration that allowable emissions from the proposed project, including secondary emissions, would not cause or contribute to air pollution in violation of any national ambient air quality standard (NAAQS) in any air quality control region or any applicable maximum allowable increase over the baseline concentration in any area (i.e., ambient air increments). These analyses were conducted in accordance with the methodology outlined in the approved modeling protocol.

Preliminary Screening

In order to determine if refined modeling was required, MCA first modeled the emissions increases attributed to facility using AERMOD (Version 21112). As shown in the following table, the preliminary screening indicates that the maximum offsite ground level concentrations of all regulated NSR pollutants will not exceed their respective significant impact levels (SILs); therefore, refined modeling and increment analysis are not required.

Pollutant	Averaging Period	Modeling Results ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Refined Modeling
$PM_{2.5}$ (*)	24-hour	1.06 + 0.03 (*)	1.2	Not Required
	Annual	0.11 + 0.001 (*)	0.13	Not Required
PM_{10}	24-hour	2.16	5	Not Required
	Annual	0.26	1	Not Required
NO_2	1-hour	7.45	7.5	Not Required
	Annual	0.34	1	Not Required
CO	1-hour	885.71	2,000	Not Required
	8-hour	457.24	500	Not Required
(*) Secondary $PM_{2.5}$				

Secondary $PM_{2.5}$ analysis: MCA utilized the "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs)" approach to assess the impacts of the proposed facility on the secondary formation of $PM_{2.5}$. The closest hypothetical source to the MCA Geismar Site is the Central U.S. Domain (CUSD) hypothetical source 10 (i.e., Louisiana-New Orleans), which is approximately 85 km to the southeast of the site. The analysis considered a hypothetical source with 500 tons/year of NOx emissions and 500 tons/year of SO_2 emissions to estimate the impact of NOx and SO_2 emissions from MCA Geismar Site. These emission thresholds were compared to the project's emissions.

		Daily $PM_{2.5}$		Annual $PM_{2.5}$	
		NOx	SO_2	NOx	SO_2
A	Hypothetical Source Emissions (tons/year)	500	500	500	500
B	Modeled Emission Rates for Precursors (MERP) (tons/year)	5087	2148	41727	11228
C	MCA Geismar Site Emissions (tons/year)	129.39	1.84	129.39	1.84
D	Calculated Project Impact [C/B]	0.0254	0.0009	0.0031	0.0002
E	Secondary $PM_{2.5}$ Impact from the Site (μg/m^3) (D*SIL)	0.0315		0.0006	

Ozone analysis: MCA also utilized the MERPs approach to assess the impacts of the proposed facility on the formation of ozone . The closest hypothetical source to the MCA Geismar Site is the Central U.S. Domain (CUSD) hypothetical source 10 (i.e., Louisiana-New Orleans). The analysis considered a hypothetical source with 500 tons/year of NOx emissions and 1000 tons/year of VOC emissions to estimate the impact of NOx and VOC emissions from MCA Geismar Site. These emission thresholds were compared to the project's emissions.

		NOx	VOC
A	Hypothetical Source Emissions (tons/year)	500	1000
B	Modeled Emission Rates for Precursors (MERP) (tons/year)	375	2618
C	MCA Geismar Site Emissions (tons/year)	129.39	75.22
D	Calculated Project Impact [C/B]	0.345	0.029
E	Total Ozone Impact from MCA Geismar Site (ppb)	0.374	

D. ADDITIONAL IMPACT ANALYSES

LAC 33:III.509.O requires an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the proposed facility and general commercial, residential, industrial, and other growth associated with the proposed facility.

Visibility

If there were sensitive receptors (state parks, wellness areas, local air ports, scenic site and overlooks) located within the proposed project's daily significant impact area (SIA), near-field visibility analyses are required to determine the effects of the proposed project's emissions (particulates and NOx) on the visibility of these sensitive receptors. The analyses are generally conducted using the VISCREEN model. Level 1 screening analysis is conservative, and the required inputs for performing the analysis are emission rates, distances, and the background visual range. Level 2 screening analysis is less conservative, but is also more complex to perform. The US EPA Workbook for Plume Visual Impact Screening and Analysis provides guidance for conducting an impairment analysis using the US EPA VISCREEN model. Since the screen modeling results indicate that impacts of emissions from the proposed site are less than their respective significant impact levels, the SIA is not expected to affect any sensitive receptors.

Soils and Vegetation

The US EPA has developed the secondary NAAQS to protect certain air quality-related values (i.e., soil and vegetation) that are not sufficiently protected by the primary NAAQS. The secondary NAAQS represent ambient air concentrations below which most types of soil and vegetation are not affected by criteria pollutants. Since the ambient air concentrations of the criteria pollutants are found to be less than the secondary NAAQS, it is presumed that the emissions from the proposed source will not result in harmful effects to either soil or vegetation.

Commercial, Residential, Industrial, and Other Growth

The elements of a growth analysis include a projection of associated industrial, commercial, and residential growth that will occur in the area of impact due to the proposed project, including the potential impact on ambient air due to this growth. MCA anticipates that 125 full-time employees will be hired as a result of the proposed project, and that the majority of these new employees will be existing residents of Ascension Parish and/or nearby parishes. Negligible growth-related ambient air impacts are expected.

In sum, the project is not anticipated to have any significant adverse impacts on commercial, residential, industrial, or other growth in the area.

E. ADDITIONAL REQUIREMENTS FOR SOURCES IMPACTING CLASS I AREAS

In accordance with LAC 33:III.509.P, if LDEQ receives a PSD application for a project that "may affect" a Class I area, additional requirements may be imposed on the applicant. The meaning of the term "may affect" is interpreted by EPA policy to include all new major sources and major modifications located within 100 kilometers (km) of a Class I area. However, if emissions from a new major source or major modification located further than 100 km from a Class I area are significant, LDEQ and/or the Federal Land Manager (FLM) can ask the applicant to perform additional analyses to assess the potential impacts of such source or modification on that Class I area.

In order to determine whether a distant source or modification may affect a Class I area, LDEQ uses the Q/d approach. Q/d refers to the ratio of the sum of the net emissions increases of PM_{10}, SO_2, NO_X, and H_2SO_4 (in tons) to the distance (in kilometers) of the facility from the nearest boundary of the Class I area.

$$Q/d = \frac{PM_{10\,(NEI)} + SO_{2\,(NEI)} + NO_{X\,(NEI)} + H_2SO_{4\,(NEI)}{}^{7}}{\text{Class I km}}$$

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[7] If the project did not trigger a netting analysis, LDEQ inputs the project increase instead (see LAC 33:III.509.A.4). In this case, the value would be less than the pollutant's significance level.

In the case of MCA Geismar Site,

$$Q/d = \frac{\mathbf{39.60} + \mathbf{1.84} + \mathbf{129.39} + \mathbf{0}}{\mathbf{210}} = \mathbf{0.81}$$

Because Q/d is less than 10, LDEQ has determined that the MCA Geismar Site will not adversely impact any air quality related value (AQRV) in the Breton National Wildlife Refuge, the nearest Class 1 area.

SPECIFIC CONDITIONS

Mitsubishi Chemical America, Inc. - MCA Geismar Site
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1. The permittee is authorized to operate in conformity with the specifications submitted to the Louisiana Department of Environmental Quality (LDEQ) as analyzed in LDEQ's document entitled "Preliminary Determination Summary" dated October 30, 2023, subject to the BACT selection and limitations set forth in Table III and IV of this permit and in the following specific conditions. Specifications submitted are contained in the application dated October 21, 2022, and additional information dated June 28, 2023, November 1, 2023, and May 16, 2024.

2. The permittee shall comply with the Louisiana Air Emission Permit General Conditions set forth in LAC 33:III.537.A.

3. Where this permit references "good combustion practices," the permittee shall monitor all parameters as recommended by the manufacturer (e.g., flue gas oxygen content, combustion air flow, fuel consumption, and flue gas temperature). These parameters shall be maintained within the manufacturer's recommended operating guidelines or within a range that is otherwise indicative of proper operation of the emissions unit.

4. The permittee shall utilize Continuous Emissions Monitoring Systems (CEMS) to monitor and record NOx and CO emissions from the CO MeOH Auxiliary Boiler (EQT0001), Formalin Plant Thermal Oxidizer (EQT0007), and the MMA Plant Thermal Oxidizer (EQT0008), and NOx emissions from the CO MeOH Fired Heater and MMA Plant HTF Package Heaters A/B/C (EQT0002 through EQT0005). The CEMS shall be calibrated, operated, and maintained according to the manufacturer's specifications and the following requirements:

   a. NOx: Comply with 40 CFR Part 60, Appendix B, Performance Specification 2.

   b. CO: Comply with 40 CFR Part 60, Appendix B, Performance Specification 4 or 4A, as applicable.

   c. Evaluate in accordance with Procedure 1 of 40 CFR 60, Appendix F.

   d. Data availability as specified by Part 70 General Condition V of LAC 33:III.535.A.

   e. NO_2/NO_X in-stack ratio determination in conjunction with Performance Specification 2.

SPECIFIC CONDITIONS

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5. Permittee shall not operate the equipment listed in the following table without SCR or SCR+LNB for more than the listed times or exceed the prescribed emission limits. To demonstrate compliance with these limits, permittee shall monitor and record the operating times that the equipment operates without SCR or SCR+LNB. These records shall be available to the LDEQ upon request.

EQT No.	Equipment	SCR Maintenance		Startups / Shutdowns		
		hours/year	NOx (lbs/hour)	hours/year	NOx (lbs/hour)	CO (lbs/hour)
EQT0001	B6109	36	41.73	100	41.73	117.89
EQT0002	B6101	36	15.75	100	15.75	38.56
EQT0003	B7801A	36	7.30	100	7.30	26.81
EQT0004	B7801B	36	7.30	100	7.30	26.81
EQT0005	B7801C	36	7.30	100	7.30	26.81

6. Permittee shall not operate the equipment listed in the following table without SNCR for more than the listed times or exceed the prescribed emission limits. To demonstrate compliance with these limits, permittee shall monitor and record the operating times that the equipment operates without SNCR or SNCR+LNB. These records shall be available to the LDEQ upon request.

EQT No.	Equipment	SNCR Maintenance	
		hours/year	NOx (lbs/hour)
EQT0007	B5701	36	7.51
EQT0008	L7402	36	35.44

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TABLE I: BACT COST SUMMARY

Control Alternatives	Availability/ Feasibility	Negative Impacts	Control Efficiency (%)	Emissions Reduction (TPY)	Capital Cost ($MM)	Annualized Cost ($MM)	Average Cost Effectiveness ($/ton)	Notes
Carbon Capture and Sequestration	Yes/no	1	90	449,275	1,236.48	152.51	339	Rejected
Negative impacts: 1) economic, 2) environmental, 3) energy, 4) safety								

TABLE II: AIR QUALITY ANALYSIS SUMMARY ($\mu g/m^3$)

Pollutant	Averaging Period	Total Screening Concentration	Significant Impact Level	Significant Monitoring Concentration	Background	Maximum Modeled Concentration	Modeled + Background Concentration	NAAQS	Modeled PSD Increment Consumption	Allowable Class II PSD Increment
$PM_{2.5}$ (a)	24-hour	1.09	1.2	4	-	-	-	35	-	9
	Annual	0.11	0.13	-	-	-	-	12	-	4
PM_{10}	24-hour	2.16	5	10	-	-	-	150	-	30
	Annual	0.26	1	-	-	-	-	-	-	17
NO_2	1-hour	7.45	7.5	-	-	-	-	188	-	-
	Annual	0.34	1	14	-	-	-	100	-	25
CO	1-hour	885.71	2000	-	-	-	-	40,000	-	-
	8-hour	457.24	500	575	-	-	-	10,000	-	-
(a) Includes secondary $PM_{2.5}$.										

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TABLE III: BACT SELECTIONS

ID No.		$PM_{10}/PM_{2.5}$	NOx	CO	VOC
EQT0001 – EQT0008	General	Use of gaseous fuels (fuel gas and/or natural gas), good combustion practices, and proper equipment (burner) design/operation			
EQT0001	Normal Operation	<= 0.0075 lb/MM BTU	SCR + LNB NOx <= 0.015 lb/MM BTU (30 day rolling average)	Oxidation catalyst Compliance with 40 CFR 63 Subpart DDDDD CO <= 5 ppmvd (@3% O_2, annual average) CO <= 10 ppmvd (@3% O_2, hourly average)	CO Oxidation catalyst Compliance with 40 CFR 63 Subpart DDDDD
	MSS		NOx <= 0.13 lb/MM BTU (hourly average) Without SCR for SU/SD <= 100 hours/year and for SCR Maintenance <= 36 hours/year	Compliance with 40 CFR 63 Subpart DDDDD CO <= 500 ppmvd (@3% O_2, hourly average) SU/SD <= 100 hours/year	VOC: <= 0.0027 lb/MM BTU (natural gas) <= 0.0036 lb/MM BTU (fuel gas)
EQT0002	Normal Operation	<= 0.0075 lb/MM BTU	SCR + LNB NOx <= 0.015 lb/MM BTU (30 day rolling average)	Oxidation catalyst CO <= 5 ppmvd (@3% O_2, hourly average)	CO Oxidation catalyst
	MSS		NOx <= 0.15 lb/MM BTU (hourly average) Without SCR for SU/SD <= 100 hours/year and for SCR Maintenance <= 36 hours/year	CO <= 500 ppmvd (@3% O_2, hourly average) SU/SD <= 100 hours/year	VOC: <= 0.0027 lb/MM BTU (natural gas) <= 0.0047 lb/MM BTU (fuel gas)
EQT0003 EQT0004 EQT0005	Normal Operation	<= 0.0075 lb/MM BTU	SCR + LNB NOx <= 0.01 lb/MM BTU (3 one-hour average)	Oxidation catalyst Compliance with 40 CFR 63 Subpart DDDDD CO <= 5 ppmvd (@3% O_2, hourly average)	CO Oxidation catalyst Compliance with 40 CFR 63 Subpart DDDDD
	MSS		NOx <= 0.10 lb/MM BTU (hourly average) Without SCR for SU/SD <= 100 hours/year and for SCR Maintenance <= 36 hours/year	Time limit <= 100 hours/year Compliance with 40 CFR 63 Subpart DDDDD CO <= 500 ppmvd (@3% O_2, hourly average)	VOC <= 0.0027 lb/MM BTU
EQT0006	200 hrs/year	<= 0.0075 lb/MM BTU	NOx <= 0.098 lb/MM BTU	Compliance with 40 CFR 63 Subpart DDDDD CO <= 0.082 lb/MM BTU	Compliance with 40 CFR 63 Subpart DDDDD VOC <= 0.0054 lb/MM BTU
EQT0007	Normal Operation	<= 0.0075 lb/MM BTU	LNB + (SNCR or FGR) NOx <= 0.035 lb/MM BTU	CO <= 0.05 lb/MM BTU	CMS for O_2 and temperature VOC removal efficiency => 99.9%
	MSS		LNB, Time limit <= 36 hours/year NOx <= 0.07 lb/MM BTU (hourly average)	CO <= 5.36 lb/hr	
EQT0008	Normal Operation	Baghouses	SNCR + LNB NOx <= 0.055 lb/MM BTU	CO <= 0.0824 lb/MM BTU	CMS for O_2 and temperature VOC removal efficiency => 99.99%
	MSS		NOx <= 0.15 lb/MM BTU	CO <= 19.47 lb/hr	

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TABLE III: BACT SELECTIONS

ID No.	$PM_{10}/PM_{2.5}$	VOC	GHG
EQT0001 – EQT0008	-	-	Use of low carbon intensity gaseous fuels Good combustion and operating practices Efficiency improvement measures
EQT0010	Drift eliminators Drift rate <= 0.0005% TDS <= 1505 ppm (annual average)	Compliance with 40 CFR 63.104	-
EQT0011	-	Compliance with 40 CFR 63 Subpart G	-
Storage Tanks (Listed in Table IV)	-	Equip with fixed roofs Closed vent system followed by flare or thermal oxidizer/scrubber	-
Process Vents	-	Closed vent system followed by a flare, boiler, heater, or thermal oxidizer	Closed vent system followed by a flare, boiler, heater, or thermal oxidizer
FUG0001	-	Leak detection and repair (LDAR) program per TCEQ28 and 40 CFR 63 Subpart H	Leak detection and repair (LDAR) program per TCEQ28 and 40 CFR 63 Subpart H
FUG0002	Pave all in-plant haul roads Post and limit maximum speed limit at 10 mph Comply with LAC 33:III.1305	-	-
EQT0009	(For all pollutants) Compliance with 40 CFR 63.670 and 63.671 as specified in 40 CFR 63.108(a) Use of natural gas for pilot gas/assist gas Proper equipment design and good combustion practices		
EQT0012	(For all pollutants) Proper equipment design and good combustion practices Use ultra-low sulfur diesel (ULSD) as fuel NOx and CO: Low emission combustion Compliance with 40 CFR 60 Subpart IIII PM_{10} <= 0.15 g/hp-hr, (NOx + NMHC) <= 4.8 g/hp-hr, CO <= 2.6 g/hp-hr, GHG <= 1.16 lb/hp-hr		

TABLE IV: BACT SELECTIONS FOR STORAGE TANKS

EQT No.	Description	Applicable Regulations		BACT Selection
		LAC 33:III.2103	40 CFR 63 Subpart G	
EQT0013	F7618A – Stripper Process Condensate Tank A	-	Group 2 Wastewater Tank	Fixed Roof
EQT0014	F7618B – Stripper Process Condensate Tank B	-	Group 2 Wastewater Tank	Fixed Roof
EQT0015	F7501 – Wastewater Buffer Tank	-	Group 2 Wastewater Tank	Fixed Roof
EQT0016	F7802 – HTF Storage Tank	-	-	Fixed Roof
EQT0017	F7230 – Urea Solution Storage Tank	-	-	Fixed Roof
EQT0019	F7602A – MMA Product Tank A	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0020	F7602B – MMA Product Tank B	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0021	F7603 – Aqueous Phase Tank	-	Group 1 Wastewater Tank	Scrubber + Thermal Oxidizer
EQT0022	F7604 – MMA Reactor Feed Tank	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0023	F7605 – Off Spec Crude MMA Tank	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0024	F7606 – Crude MMA Tank	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0025	F7608 – Combined Methanol Tank	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0026	F7611 – Heavy Ester Tank	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0027	F7612 – Formalin Feed Tank	-	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0028	F7613 – Azeo Tank	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0029	F7614 – Stabilizer Tank	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0030	F7616 – Raw Methanol Tank	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0031	F7617A – Pure Methanol Tank A	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0032	F7617B – Pure Methanol Tank B	X	Group 1 Storage Vessel	Scrubber + Thermal Oxidizer
EQT0033	F7619 – Pure Methanol Column Sidedraw Tank	-	Group 1 Wastewater Tank	Scrubber + Thermal Oxidizer
EQT0034	F6002 – Methanol Slop Vessel	-	Group 2 Storage Vessel	Flare
EQT0035	F6204 – Amine Sump & Storage Vessel	-	-	Flare
IA	F7511 – Caustic Tank	-	-	Fixed Roof

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TABLE V - MAXIMUM ALLOWABLE EMISSION RATES

EQT	Description		PM_{10}	$PM_{2.5}$	NO_X	CO	VOC	GHG
EQT0001	B6109 – CO MeOH Auxiliary Boiler	tons/year	*	*	*	*	*	165,499
EQT0002	B6101 – CO MeOH Fired Heater	tons/year	*	*	*	*	*	54,135
EQT0003	B7801A – MMA Plant HTF Package Heater A	tons/year	*	*	*	*	*	37637
EQT0004	B7801B – MMA Plant HTF Package Heater B	tons/year	*	*	*	*	*	37637
EQT0005	B7801C – MMA Plant HTF Package Heater C	tons/year	*	*	*	*	*	37637
EQT0006	L6104 – POx Unit Start-up Burner	tons/year	*	*	*	*	*	4125
EQT0007	B5701 – Formalin Plant Thermal Oxidizer	lbs/hour tons/year	*	*	*	*	*	- 40,769
EQT0008	L7402 – MMA Plant Thermal Oxidizer	lbs/hour tons/year	3.00 10.95	3.00 10.95	*	*	*	- 184,082
EQT0009	H7401 – Combined Flare	lbs/hour tons/year	5.55 2.19	5.55 2.19	50.68 19.94	799.18 396.65	80.45 10.05	- 223,144
EQT0010	L7201 – Cooling Tower	lbs/hour tons/year	*	*	- -	- -	10.88 23.84	- -
EQT0011	L7530 – Wastewater Treatment Plant	tons/year	-	-	-	-	0.19	-
EQT0013	F7618A – Stripper Process Condensate Tank A	tons/year	-	-	-	-	0.01	-
EQT0014	F7618B – Stripper Process Condensate Tank B	tons/year	-	-	-	-	0.01	-
EQT0015	F7501 – Wastewater Buffer Tank	tons/year	-	-	-	-	0.01	-
EQT0016	F7802 – HTF Storage Tank	tons/year	-	-	-	-	0.01	-
EQT0017	F7230 – Urea Solution Storage Tank	tons/year	-	-	-	-	0.01	-
FUG0001	MCA-FUG - Equipment Leaks	lbs/hour tons/year	- -	- -	- -	1.07 4.69	4.08 17.88	- 52
FUG0002	PM-ROAD - Plant Road Fugitives	tons/year	0.03	0.01				

* Compliance with BACT limits as specified in Table III.