

Permit Amendment

Source Analysis & Technical Review

Company	Air Products LLC	Permit Number	133027
City	Baytown	Project Number	367777
County	Chambers	Regulated Entity Number	RN108401332
Project Type	Amendment	Customer Reference Number	CN602299257
Project Reviewer	Michael Kenny	Received Date	December 14, 2023
Site Name	Baytown 3 Facility		

Project Overview

Air Products LLC (Air Products) is requesting authorization to make changes to the maintenance, start-up and shutdown (MSS) emission calculations and revise the hourly ammonia emission rate from the Steam Methane Reformer (SMR).

They are also requesting corrections to Special Conditions to:

- Add 95% monitor uptime boilerplate to flare conditions
- Reduce frequency of TDS-Conductivity verification tests
- Add PM to MAERT for EPN 1.

Emission Summary

Air Contaminant	Current Allowable Emission Rates (tpy)	Proposed Allowable Emission Rates (tpy)	Change in Allowable Emission Rates (tpy)
PM	8.61	44.54	35.93*
PM ₁₀	42.44	42.42	-0.02
PM _{2.5}	38.62	38.60	-0.02
VOC	16.94	16.92	-0.02
NO _x	40.22	40.20	-0.02
CO	80.04	79.98	-0.06
SO ₂	4.94	4.94	0.00
HAPs	3.03	3.03	0.00
NH ₃	20.15	20.15	0.00
Methanol	2.49	2.49	0.00

* PM was not previously speciated on EPN 1; however, its emission rate is known to be equal to PM₁₀, i.e., 35.95 tons per year. These emissions have always been present and allowed, but have not been speciated in the MAERT. Upon issuance, the updated PM emission rates will be included in the MAERT for completeness, resulting in a decrease of 0.02 tpy in represented PM emissions.

Federal Rules Applicability

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Requirement	
Subject to NSPS?	No
Subparts &	
Subject to NESHAP?	No
Subparts &	
Subject to NESHAP (MACT) for source categories?	No
Subparts &	

Nonattainment review applicability:

The plant is located in Chambers County, which is part of the Houston-Galveston-Brazoria nonattainment area, which is currently designated as severe nonattainment under the 2008 8-hour ozone standard and moderate nonattainment under the 2015 8-hour ozone standard.

The proposed amendment will reduce the sitewide VOC allowable emissions from 16.94 tpy to 16.92 tpy, and NO_x from 40.22 tpy to 40.20 tpy. Since both VOC and NO_x are being reduced, nonattainment new source review is not triggered by the proposed amendment.

Review Applicability	Ozone as VOC (tpy)	Ozone as NO _x (tpy)
Total Emissions currently authorized	16.94	40.22
emission change proposed in this amendment application	-0.02	-0.02
Revised Total MSS Emissions	16.92	40.20
Further review triggered for regulated pollutants?	No	No

PSD review applicability:

The Baytown 3 facility is a named PSD source and has a potential to emit (PTE) of less than 100 tons per year for each PSD pollutant; therefore, PSD review is not triggered since the PSD new major source threshold is 100 tpy. A retrospective PSD analysis (**from projects 236202 and 236215 June 2016**) demonstrated that the proposed amendment does not cause any change to the PSD determination.

Pollutant	Project Emissions Increase (tpy)	Major Source Threshold (tpy)	Increase ≥ Threshold?
CO	79.98	100	No
NO _x	40.20	100	No
PM	44.55	100	No
PM ₁₀	42.42	100	No
PM _{2.5}	38.60	100	No
SO ₂	4.87	100	No
Ozone (as VOC)	16.92	100	No
Ozone (as NO _x)	40.2	100	No

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Requirement

Title V applicability:

The site is a Title V major source and operates under Title V Site Operating Permit (SOP) No. 3991. per 30 TAC Chapter 122.

Periodic Monitoring (PM) applicability:

This site is a major source and is subject to PM under 30 TAC Chapter 122. The permit require PM as follows:

Emission Source	SC No.	PM Condition Summary
Plant fugitives	11	Audio, visual, and olfactory (AVO) checks for NH ₃ leaks shall be made and recorded once per day.
Cooling tower	17	Use a conductivity meter to measure and record the conductivity of the cooling water at a fixed monitoring point in the recirculation loop of each cooling tower at least weekly
EPN 1	15	Fuel flow monitoring is used for SO ₂ and PM compliance from combustion sources.
Flares EPN 2, 3	5	monitored by visible emission checks and follow 40 CFR 60.18

Compliance Assurance Monitoring (CAM) applicability: The site is subject to 30 TAC Chapter 122 requirements. The permits cover the following control devices which will be used to comply with applicable requirements of the permit, and which control source of emissions with a pre-control emission rate in excess of an applicable major source threshold (as defined in Title III of the Clean Air Act).

Emission Source	SC No.	CAM Condition Summary
EPN 1	14,15,1 6	a Selective Catalytic Control system for NO _x and an oxidation catalyst for CO and VOC. A NO _x CEMS is used to show compliance.

Process Description

The Baytown 3 Facility is a Hydrogen and carbon monoxide production facility. The process consists of feed gas purification, prereforming and reforming, water-gas shift conversion, CO₂ removal and drying, cryogenic separation of CO, and hydrogen purification.

Project Scope

Calculation changes

Update representations based on actual operating conditions, and revise calculations as follows:

MSS emissions were recalculated for EPNs 1 (Steam Methane Reformer), and 2 (Warm Flare). There is an increase in hourly ammonia emissions, and a net decrease in products of combustion.

PM speciation for EPN 1. The emission rate is known to be equal to PM₁₀, i.e., 35.95 tons per year. These emissions have always been present. The emissions are now speciated in the MAERT.

Requested changes to Special Conditions

1. Restore language to SC 5(A): pilot flame monitoring shall operate as required at least 95% of the time when the flare is operational, averaged over a rolling 12-month period this change will only affect the monitoring. The pilot flame will be present at all times and must be manually reignited if it was to go out..
2. SC 17(B)(3): Reduce frequency of conductivity-to-TDS conversion verification from quarterly to annually.

Air Products represents that data from testing demonstrates consistent agreement with the calculated conversion factor, so frequent testing is not required. Following a request from the permit reviewer, Air Products provided data from five years of continuous analyzer use that showed that the recorded TDS values are at all times less than 15% of the concentration limit of 14,000 ppmw required by Special Condition 9. The conductivity-to-TDS

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conversion factor was calculated quarterly during the five years of observations, averaging 0.748 parts per million by weight per microsiemens per centimeter; at no time does the factor exceed 1 part per million by weight per microsiemens per centimeter.

Air Products uses a continuous analyzer to obtain conductivity data, which provides a real-time calculated TDS value, and these have been verified by quarterly testing for the past five years. Since the calculated values of TDS are observed to be far below the concentration limit, there is no possibility of exceeding the limit as long as the continuous monitoring is maintained.

Therefore, upon approval, Special Conditions 17.B.(4) and 17.B.(5) will be added to allow for annual determinations of the conversion factor, as long as 1) a continuous analyzer is in use; 2) calculated TDS values are less than 10,000 ppmw; and 3) the conductivity-to-TDS conversion factor does not exceed 1.00. Special Condition 21.J. is modified to provide for recordkeeping demonstrating that the conditions of 17.B.(4) are met.

3. Incorporate PBRs 156318 and 169208 by reference. Special Condition 22 is added.
4. Represent PM in MAERT for EPN No. 1. The current MAERT only speciates PM₁₀ and PM_{2.5}. Allowable emission calculations for PM₁₀ in the current permit are based on emission factors for PM for the Steam Methane Reformer, so PM emissions are equal to PM₁₀; that is: 9.82 lb/hr and 35.97 tons/year. With this amendment, the PM/PM₁₀ hourly rate remains the same, while the annual rate is reduced to 35.95 tons/year. These values will now be shown on the MAERT. This change does not have any effect on impacts evaluations, since by the definition of PM, the emission must be at least as large as PM₁₀, and impacts have been evaluated on that basis.

Modeling and MERA analysis are provided.

A retrospective federal applicability review (from projects 236202 and 236215 June 2016) is provided showing that there is no change to the PSD status resulting from this action.

Changes to Special Conditions (SCs) and MAERT

Current SC Number	Proposed SC Number	Changes Being Made
5.A.	5.A.	Added Sentence to pilot flame monitoring condition: . The monitors and analyzers shall operate as required by this section at least 95% of the time when the flare is operational, averaged over a rolling 12-month period.
--	17.B.(4)	Added Special Condition: (4) After four consecutive quarterly determinations of the conversion factor per (3) above, if the following three conditions are met, the frequency of the measurement of the conductivity-to-TDS conversion factor may be reduced to at least once annually: (a) conductivity is measured by continuous Online Analyzer which makes observations at least 4 times per hour. The analyzer shall operate as required by this section at least 95% of the time when the cooling tower is operational, averaged over a rolling 12-month period; (b) the average calculated TDS value observed over any one hour does not exceed 10,000 ppmw; (c) the calculated conductivity-to-TDS conversion factor does not

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		(d) exceed 1.00.
--	17.B.(5)	Added Special Condition: (5) If any of the conditions (4)(a), (4)(b), or 4(c) above are not met, the frequency of measurement of TDS shall revert to what is provided in (3) above.
18	18	Added December 14, 2023 to represent the changes made in this amendment.
21.J	21.J	Added wording to recordkeeping requirements for TDS readings: ...including any determinations made under Special Condition 17.B.(4) above.
--	22.	Added Special Condition: The following sources and/or activities are authorized under a Permit by Rule (PBR) by Title 30 Texas Administrative Code Chapter 106 (30 TAC Chapter 106). These lists are not intended to be all inclusive and can be altered without modifications to this permit.

MAERT	Changes Being Made
EPN 1	Updated NO _x , CO, VOC, PM, PM ₁₀ , PM _{2.5} , SO ₂ , NH ₃ emission rates
EPN 2	Updated NO _x , CO emission rates
Note (3)	Added omitted pollutant definition: NH ₃ - ammonia

Best Available Control Technology

Source Name	EPN	Best Available Control Technology Description
Steam Methane Reformer	1	Burners with the best NO_x performance given the burner configuration and gaseous fuel used. 0.01 lb NO_x/MMBtu on a rolling 24-hour average; 0.0062 lb NO_x/MMBtu on rolling 12-month average (using SCR for LAER) SCR if firing rate is > 300 MMBtu/hr and burner is >0.01 lb/MMBtu. CEMS is required since the SCR firing rate is greater than 100 MMBtu/hr. For CO 50 ppmv corrected to 3% O₂. It is 0.005 lb CO/MMBtu at normal and high loads. The Heater fires pipeline quality natural gas which burns at a rate of 0.0017lb VOC/MMBtu as per vendor data. The max opacity is 5 %. For NH₃ 10 ppm corrected to 3% O₂ on a rolling 24 hour averaging period. This meets Tier 1 BACT. MSS BACT is the same as routine besides the following. 0.0054 lb voc/mmBtu as per AP-42 at low loads and 0.1374 lb NO_x/MMBtu since SCR is not used during MSS 0.0824 lb CO/MMBTU as per AP-42. This meets Tier 1 BACT.

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Warm Flare	2	The following standards meet Tier 1BACT. The emission factor is NOx is 0.0641 lb/MMBtu on 24-hour average. The emission factor for CO is 0.5496 lb/MMBtu at high loads this device meets 40 CFR 60.18 and has a destruction efficiency of 98%. And has inherently low sulfur gases MSS Same as routine.
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Permits Incorporation

Permit by Rule (PBR) / Standard Permit / Permit Nos.	Description (include affected EPNs)	Action (Reference / Consolidate / Void)
156318	Piping components and filters (EPN CO-FUG)	Reference
169208	Hydrogen vent (EPN 8)	Reference

Impacts Evaluation

Was modeling conducted?	Yes	Type of Modeling:	AERMOD
Is the site within 3,000 feet of any school?			NO
Additional site/land use information:			

Summary of Modeling Results

The air quality analysis is acceptable for all review types and pollutants. The results are summarized below.

This is an as-built amendment to Permit No. 133027 and N220. This analysis updates the permit application representations and emission rates to reflect revised maintenance, start-up, and shutdown emissions. The applicant evaluated the project the same as the original submittal but incorporated the as-built changes associated with this project. A. Minor Source NSR and Air Toxics Analysis Air Products LLC provided a qualitative analysis CO and NO2. For CO, the applicant stated that there is no hourly increase in emissions, so the annual increase of CO does not necessitate an impacts analysis. For NO2, the applicant stated that the annual emission increase from the warm flare is smaller than the annual emission decrease from the SMR. The applicant modeled the annual generic unit impact from the warm flare and compared that to the annual generic unit impact from the SMR and found that the concentration from the warm flare is less than the concentration from the SMR. This indicates an expected decrease in off-property concentrations. No additional modeling was conducted as this project does not affect the previously permitted NO2 impact.

Table 1. Generic Modeling Results

Source ID	1-hr GLCmax (µg/m³ per lb/hr)	Annual GLCmax (µg/m³ per lb/hr)
EPN1	0.76	0.02
MSS1	0.76	0.02
MSS2	0.09	0.0003
EPN5	9.50	0.32
EPN6	84.41	1.85
MSS7AC	227.55	6.93
SMRFG V	81.90	9.65

Table 2. Minor NSR Project (Increases Only) Modeling Results for Health Effects

Pollutant	CAS #	Averaging Time	GLCmax (µg/m³)	10% (µg/m³)
Ammonia	7664-41-7	Annual	2.88	9.2

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Table 3. Minor NSR Site-wide Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	GLC max Location	GLCni ($\mu\text{g}/\text{m}^3$)	GLCni Location	ESL($\mu\text{g}/\text{m}^3$)
Ammonia	7664-41-7	1-hr	50	25m E Property Line	6	1,135m SW	180

The GLCmax and the GLCni locations are listed in Table 3 above. The locations are listed by their approximate distance and direction from the property line of the project site.

The applicant did not conduct site-wide modeling for ammonia following the guidance for modeling site-wide emissions as a member of a single property line designation (SPLD). The site-wide modeling presented represents all emissions from Air Products LLC but does not include other emissions of ammonia from the other companies that are part of the SPLD. The applicant provided a qualitative analysis of the SPLD emissions including: data on the locations, source parameters, and emission rates for the other sources located within the SPLD boundary. The sources with the largest ammonia emissions are located in the far northeastern corner of the SPLD boundary whereas Air Products LLC is located in the far southwestern corner. Sources with relatively smaller ammonia emissions are located in the central area of the SPLD boundary. Based on this information, the applicant concluded that inclusion of these sources would not significantly impact the modeling results. The ADMT believes based on this information that it is unlikely that the plumes associated with the largest emitting sources, located roughly 2 kilometers north of the project sources, and those associated with the project site sources would cross. As such, the ADMT concludes that this analysis is reasonable. However, all future analyses should follow TCEQ and ADMT guidance for evaluating site-wide emissions associated with an SPLD member site.



8/8/2024

Project Reviewer
Michael Kenny

Date



Team Leader
Matthew Ray

9/17/2024

Date