

Permit Amendment Source Analysis & Technical Review

Company	PermaBase Building Products, LLC	Permit Number	159287
City	Cleburne	Project Number	367143
County	Johnson	Regulated Entity Number	RN100745660
Project Type	Amendment	Customer Reference Number	CN605853795
Project Reviewer	Miyah Calhoun	Received Date	December 1, 2023
Site Name	Concrete Backerboard Plant		

Project Overview

PermaBase Building Products, LLC (PermaBase) owns and operates an existing cement backer board manufacturing facility in Cleburne, Johnson County. PermaBase has submitted an amendment application to replace the polystyrene expander and natural gas-fired boiler. Additionally, PermaBase has requested an increase in production throughput.

Planned maintenance, startup, and shutdown (MSS) activities are either included in the authorized emissions for the permit, qualify as de minimis sources under 30 TAC § 116.119, or meet the requirements for a PBR under 30 TAC Chapter 106.

Emission Summary

Upon approval, the maximum allowable emissions will be as follows:

Air Contaminant	Current Allowable Emission Rates (tpy)	Allowable Emission Rates Authorized by Consolidated PBRs and SPs (tpy)	Proposed Allowable Emission Rates (tpy)	Change in Allowable Emission Rates (tpy)
PM	0.08	0.03	0.14	+ 0.03
PM ₁₀	0.08	0.03	0.14	+ 0.03
PM _{2.5}	0.08	0.03	0.14	+ 0.03
VOC	37.5	10.41	30.53	- 17.38
NO _x	1.03	0.58	0.58	- 0.58
CO	0.86	0.36	1.57	+ 0.35
SO ₂	0.01	0.01	0.02	--
Pb	0.01	--	0.01	--
HAPs	--		<10(individual)/<25(total)	<10(individual)/<25(total)

* The proposed allowable emission rates include the consolidation of emissions that were previously authorized by a permits by rule and standard permit.

Federal Rules Applicability

Requirement

Subject to NSPS?	No
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NSPS does not apply since the site is not an affected facility under 40 CFR Part 60.

Subject to NESHAP?	No
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The site does not emit any air contaminants regulated under 40 CFR Part 61.

Subject to NESHAP (MACT) for source categories?	No
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The site is not a listed source category regulated under 40 CFR Part 63.

Nonattainment review applicability: The site is located in Johnson County which is currently classified as a severe nonattainment county for ozone. The site is a major source with allowable emissions of 37.5 tpy VOC. The amendment will authorize a decrease in total emissions of 17.38 tpy VOC. Although this is an existing major source of VOC, the project is less than the major source threshold; therefore, nonattainment review is not applicable.

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PSD review applicability: The site is not a named source and emits below the federal threshold of 250 tpy of any criteria pollutant. Therefore, PSD review is not applicable.

Title V Applicability - 30 TAC Chapter 122 Rules

Requirement

Title V applicability:

The site is operating under SOP No. O-4570.

Periodic Monitoring (PM) applicability:

Periodic monitoring is applicable because the site is subject to 30 TAC Chapter 122. Periodic monitoring in the form of recordkeeping, visible emissions observations and opacity measurements, pressure differential measurements across all filter media, and temperature monitoring for the RTO are used to demonstrate compliance with the permit limits.

Compliance Assurance Monitoring (CAM) applicability:

CAM is applicable because the site is subject to 30 TAC Chapter 122; therefore, CAM is applicable for VOC. Initial testing of the RTO is required and temperature monitoring of the combustion chamber temperature will be recorded on a continuous basis.

Process Description

Polystyrene plastic beads are used as additives in backer board manufacturing. The raw beads are loaded to the expander. The beads go through a two-pass expansion process and then are stored for aging. The emission from the polystyrene bead expansion and aging processes are routed through a natural gas-fired regenerative thermal oxidizer (RTO). The RTO is designed to achieve a minimum destruction efficiency of 98 percent. Sixty percent of the original pentane content of the bead is estimated to be released through expanding and aging and captured to the RTO.

After aging, expanded and aged polystyrene beads are fed into a mixer with the other raw materials including fly-ash, Portland cement, lime, limestone, slag, and water to form a cement slurry that is applied to a moving process belt or conveyor. The cement mix is formed, vibrated, and smoothed before going to the drying oven. The cement board is dried in the oven with steam-heated hot air. The steam is provided by the same boiler that serves the expander. Additional pentane VOC is lost from the expanded polystyrene in the manufacturing process downstream of aging. It is estimated that 30% of the original pentane content of the polystyrene bead is lost at this stage of the process as fugitive emissions.

An ink jet printer prints a logo on each cement backer board at the end of the process line. Emissions from the printing ink are lost to the atmosphere through openings in the building and vents on the roof. The dried board is conveyed to the board end sawing area and is cut to length prior to packaging and shipment.

Additional raw materials for the manufacturing process, including fly-ash, Portland cement, lime, limestone, and slag, are delivered and stored on-site. The fly-ash and limestone raw materials are stored in silos outside the manufacturing building. The remaining raw materials are stored in silos and receivers inside the building. All storage is authorized under PBR.

Project Scope

PermaBase is proposing to modify its existing cement backerboard manufacturing facility.

- Currently VOC emissions are uncontrolled. PermaBase desires to replace the current polystyrene expander at the facility with a new expander, and in doing so increase permitted annual polystyrene throughput from 500 tons to 1,025 tons. This increase will be coupled with utilization of a RTO for pentane control, which has been authorized under a Pollution Control Project standard permit.
- PermaBase has proposed to reduce the limit of pentane weight percent in raw material bead from 7.5 percent to 6.8 percent.
- PermaBase has proposed to replace an existing 2.52 MMBTU/hr boiler, which provides steam for the expander and a downstream oven, with a 3.6 MMBTU/hr natural gas fired boiler.

Best Available Control Technology

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Source Name	EPN	Best Available Control Technology Description
Polystyrene Expansion	PolyExpFUG	<ul style="list-style-type: none"> Permanent Total Enclosures at the expanding and aging processes VOC content of polystyrene beads shall not exceed 6.8% by weight and the total throughput of polystyrene beads shall not exceed 500 tons per twelve (12) month consecutive period VOC emissions from expander and aging rooms are routed to an RTO that is designed to achieve a minimum destruction efficiency of 98 percent Reduction in maximum pentane content of polystyrene bead from 7.5 weight % to 6.8 weight percent
Printing Ink Fugitives	PolyExpFUG	<ul style="list-style-type: none"> Good housekeeping for spills Use of ink jet printer to minimize emissions Storage of waste materials and shop towels in closed containers.
Natural gas fired combustion equipment (Boiler and RTO)	RTO and BOILER	<ul style="list-style-type: none"> Use of pipeline quality natural gas Good combustion practices and operation of combustion equipment in accordance with manufacturer instructions
RTO Maintenance, Start-up, and Shutdown	RTO-MSS	<ul style="list-style-type: none"> Minimize polystyrene bead expansion during MSS Minimize duration and frequency of MSS events

Permits Incorporation

Permit by Rule (PBR) / Standard Permit / Permit Nos.	Description (include affected EPNs)	Action (Reference / Consolidate / Void)
PBR § 106.203 (Registration No. 43115)	Specialty Concrete Batch Plant	Reference
PBR § 106.261/262 (Registration No. 81839)	Fly Ash and Limestone Storage Silo	Reference
PBR § 106.261/262 (Registration No. 87887)	Limestone Receiving Vessel	Reference
PBR § 106.262 (Registration No. 169575)	Lime Silo	Reference
Pollution Control Project Standard Permit (Permit No. 174538)	Installation of Thermal Oxidizer and associated MSS	Consolidate
PBR § 106.418 (Claimed/Non-registered)	Printing Presses	Consolidate
PBR § 106.183 (Claimed/Non-registered)	Boiler	Consolidate

Impacts Evaluation

Was modeling conducted? **Yes**

Type of Modeling: **Screen3**

Is the site within 3,000 feet of any school?

No

Additional site/land use information: The area surrounding the site is industrial and oil and gas operation per site review.

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Summary of Modeling Results

PermaBase performed a Modeling and Effects Review Applicability (MERA) evaluation to characterize the proposed increase in short-term emissions. API evaluated all of the air pollutants from each source on a short-term basis. For the short-term emissions, two of the air pollutants had no increases (Step 1) or met the de minimis criteria outlined in Step 2 of the MERA and therefore, the MERA analysis was complete for those pollutants. For those compounds that did not meet Step 2, the MERA evaluation continued.

Screen3 modeling was performed using a unitized emission rate of 1 lb/hr to predict a generic short-term impact for each EPN. The generic impact for each EPN was then multiplied by the proposed pollutant specific emission rates from the EPN and summed to calculate a maximum predicted off-property concentration for each pollutant. The emission increase for the remaining compound resulted in impacts that are less than or equal to 10 percent of their effects screening level (ESL) consistent with Step 3 of the MERA.

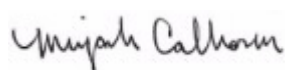
All of the chemicals under evaluation met the criteria of the MERA evaluation. Given this, no short- or long-term adverse health effects are anticipated to occur among the general public as a result of exposure to the proposed emissions from this facility.

The impacts for 24-hour PM₁₀, 24-hour PM_{2.5}, 1-hour CO, 8-hour CO, and 8-hour ozone were below the SIL; therefore, a more comprehensive cumulative modeling analysis for PM₁₀, PM_{2.5}, and CO is not required

Modeling Results for Minor NSR Comparison

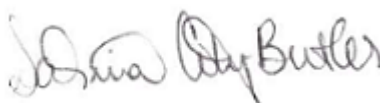
Pollutant	Averaging Time	GLC _{MAX} modeled ($\mu\text{g}/\text{m}^3$)	De Minimis ($\mu\text{g}/\text{m}^3$)	Less than De Minimis?
PM ₁₀	24-Hour	0.58	5	Yes
PM _{2.5}	24-Hour	0.58	1.2	Yes
	Annual	0.11	0.13	Yes
CO	1-Hour	16.32	2,000	Yes
	8-Hour	11.43	500	Yes

All criteria pollutants are predicted not to cause or contribute to an exceedance of the NAAQS. All non-criteria pollutants are predicted not to cause an adverse impact on human health or welfare.



October 9, 2024

Project Reviewer
Miyah Calhoun



October 11, 2024

Team Leader
Sabrina Coty-Butler

Date