PUBLIC NOTICE

Bridgestone Americas Tire Operations, LLC – Warren Plant has applied to the Tennessee Department of Environment & Conservation, Division of Air Pollution Control (Division identification number 89-0077/981102) for approval to expand its tire manufacturing facility in Morrison, Warren County, Tennessee. The expansion will provide for additional tire capacity at the Warren Plant location. The project is subject to review under the State rule for Prevention of Significant Deterioration of Air Quality (PSD), Paragraph 1200-03-09-.01(4) of the Tennessee Air Pollution Control Regulations, which requires a public notification and 30-day public comment period.

The Division of Air Pollution Control has reviewed the application with respect to the above-mentioned PSD regulations and has determined that construction can be approved if certain conditions are met. A copy of the PSD application materials, a copy of the PSD preliminary determination, and a copy of the draft construction permit are available for public inspection during normal business hours at the following locations:

Cookeville Environmental Field Office
Division of Air Pollution Control
1221 South Willow Avenue
Cookeville, TN 38506

TDEC Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Electronic copies of the draft permit and supporting materials are available by accessing the TDEC internet site located at:

https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-air.html

Questions concerning the source(s) may be addressed to Justin Dolzen at (615) 532-0575 or by e-mail at justin.dolzen@tn.gov.

Interested parties are invited to review these materials and comment. In addition, a public hearing may be requested at which written or oral presentations may be made. To be considered, written comments or requests for a public hearing must be received no later than 4:30 PM on **February 26, 2024**. To assure that written comments are received and addressed in a timely manner, written comments must be submitted using one of the following methods:

1. **Mail, private carrier, or hand delivery:** Address written comments to Ms. Michelle W. Owenby, Director, Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 15th Floor, Nashville, Tennessee 37243.

2. **E-mail**: Submit electronic comments to air.pollution.control@tn.gov.

A final determination will be made after weighing all relevant comments.

Individuals with disabilities who wish to review information maintained at the above-mentioned depositories should contact the Tennessee Department of Environment and Conservation to discuss any auxiliary aids or services needed to facilitate such review. Such contact may be in person, by writing, telephone, or other means, and should be made no less than ten days prior to the end of the public comment period to allow time to provide such aid or services. Contact the Tennessee Department of Environment and Conservation ADA Coordinator, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 2nd Floor, Nashville, TN 37243, (866) 253-5827. Hearing impaired callers may use the Tennessee Relay Service, (800) 848-0298.

Air Pollution Control DATE: January 26, 2024

Assigned to – Justin Dolzen

PREVENTION OF SIGNIFICANT DETERIORATION
PRECONSTRUCTION REVIEW AND PRELIMINARY DETERMINATION
FOR
BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC
IN WARREN COUNTY, TENNESSEE

This review was performed by the Tennessee Air Pollution Control Division in accordance with the Rules for Prevention of Significant Deterioration (PSD).

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I. Rule Background

On June 3, 1981, the State of Tennessee adopted Tennessee Air Pollution Control Regulations (TAPCR) paragraph 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration (PSD). This paragraph has been subsequently amended, with the latest amendments effective December 28, 2022. Under these regulations, a new major stationary source that is included in one of 28 source categories and has the potential to emit 100 tons per year (tons/yr) or more of any criteria pollutant, or 250 tons/yr or more of any criteria pollutant located in an attainment area, must be reviewed with regard to significant deterioration prior to construction. In addition, any major stationary source which makes a major modification in an attainment area that causes a significant emissions increase must be reviewed with the same regard.

To comply with the amended PSD regulations, a source with potential emissions greater than significant amounts of a regulated pollutant must meet several criteria. The first criterion is that Best Available Control Technology (BACT) must be applied to all emission points for the applicable PSD pollutant. The second criterion is that the proposed source or modification must not cause or contribute to any violation of the National Ambient Air Quality Standards (NAAQS – see **Table 1**). Finally, increases in ambient concentrations of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and particulate matter (PM_{10} and $PM_{2.5}$) resulting from emissions discharged by the proposed source must not exceed the increments specified by the PSD regulations (**Table 2**).

Table 1: National Ambient Air Quality Standards

Pollutant		Averaging Period	Standard
Particulate Matter	(PM_{10})	24-hour (primary and secondary)	150 μg/m³ [1]
	($PM_{2.5}$)	Annual	12.0 μg/m³ (primary) [2]
			15.0 μg/m³ (secondary) [2]
		24-hour (primary and secondary)	35 μg/m³(or 100 μg/m³) [3]
Nitrogen Dioxide (NO_2)		Annual (primary and secondary)	53 ppb [4]
		1-hour (primary)	100 ppb (or 100 μg/m³) [5]
Carbon Monoxide (CO)		8-hour	9 ppm (or 10,000 μg/m³) [6]
		1-hour	35 ppm (or 40,000 μg/m³) [6]
Sulfur Dioxide (SO_2)		1-hour (primary)	75 ppb (or 197 μg/m³) [7]
		3-hour (secondary)	0.5 ppm (or 1,300 μg/m³) [6]
Lead (Pb)		3-month (primary and secondary)	0.15 μg/m³ [8]
Ozone (O_3)		8-hour (primary and secondary)	0.070 ppm (or 140 μg/m³) [9]

1. Not to be exceeded more than once per year on average over three years.
2. Annual mean, averaged over three years.
3. 98th percentile, averaged over three years.
4. Annual mean.
5. 98th percentile of 1-hour daily maximum concentration, averaged over three years.
6. Not to be exceeded more than once per year.
7. 99th percentile of 1-hour daily maximum concentrations, averaged over three years.
8. Not to be exceeded.
9. Annual fourth-highest daily maximum 8-hour concentration, averaged over three years.

Table 2: Maximum Allowable Increases (μg/m^3) for Class II Areas	
Pollutant	**μg/m^3**
PM_{10}, annual arithmetic mean	17
PM_{10}, 24-hour maximum	30
$PM_{2.5}$, annual arithmetic mean	4
$PM_{2.5}$, 24-hour maximum	9
SO_2, Annual arithmetic mean	20
SO_2, 24-hour maximum	91
SO_2, 3-hour maximum	512
NO_2, Annual arithmetic mean	25

II. Project Background and Description

Bridgestone Americas Tire Operations, LLC (BATO) is proposing to expand its rubber truck and bus tire manufacturing operations at their Morrison, Tennessee factory located in Warren County (BATO - Warren Plant). The proposed facility expansion will provide for additional tire manufacturing capacity at the Warren Plant location currently permitted in Title V Operating Permit Number 569874. A summary of the existing permitted sources is shown in **Table 3**.

Table 3: Current Permitted Sources at the Warren Plant	
Source Number	**Source Description**
89-0077-02	Railcar and Trailer Unloading, Storage, and Handling
89-0077-04	Manufacturing and Material Usage
89-0077-05	Rubber Mixing and Remilling
89-0077-10	Two 75 MMBtu/hr Boilers and One 10.3 MMBtu/hr Hydronic Heater
89-0077-18	One 99 HP Diesel Driven Emergency Engine
89-0077-19	One 15 HP Diesel Driven Emergency Engine
89-0077-20	Two 266 HP Diesel Driven Emergency Engine
89-0077-21	One 300-Gallon Gasoline Storage Tank
89-0077-22	Tire Curing

As discussed earlier, a major stationary source is one that is included in one of 28 listed source categories and that emits, or has the potential to emit, 100 tons/yr or more of any regulated NSR pollutant, or any other stationary source that emits, or has the potential to emit, 250 tons/yr or more of any regulated NSR pollutant. The existing BATO - Warren Plant (Facility ID 89-0077), the subject of this PSD application and permitting review, is a PSD major stationary source.

To accommodate the proposed increase in tire manufacturing capacity, the following modifications are necessary:

Source 89-0077-02: install one new railcar unloading station and 10 new carbon black silos;
Source 89-0077-04: install additional extruders, calendars, and cement stations;
Source 89-0077-05: install four additional mixers;
Source 89-0077-10: install one additional 75 MMBtu/hr natural gas-fired boiler with No.2 fuel oil backup;
Source 89-0077-22: install two additional tire curing trenches.

Additional tire repair equipment and oil storage tanks are being added as part of this project. These emission units will qualify as insignificant emission units and are not required to be listed in the permit. This project will cause an increase in production rates for existing permitted equipment and some existing insignificant activities.

The proposed modification will result in a significant emission increase of volatile organic compounds (VOC). The project is therefore subject to review under the regulations governing PSD.

III. Information Used in Analysis

The applicant provided the following information in their June 21, 2023, permit application and the revised BACT analysis dated August 11, 2023. The proposed expansion project will consist of modification to the following emission sources:

- Source 89-0077-02: Railcar and trailer unloading, storage, and handling;
- Source 89-0077-04: Manufacturing and material usage;
- Source 89-0077-05: Rubber mixing and remilling;
- Source 89-0077-10: Powerhouse (boilers and heaters);
- Source 89-0077-22: Tire curing.

The proposed facility expansion consists of new emission units being added to the existing emission sources listed above. The existing equipment included in the sources listed above will experience increased utilization as a result of this expansion. Emissions from the increased utilization of these processes have been evaluated and are included in the project emission summary.

IV. Emissions Analysis

Projected emission increases from the proposed project (Table 4) were obtained from the information and assumptions given in the June 21, 2023, permit application.

Table 4: Pre- and Post-Modification Emissions Comparison

		Baseline Actual	Future Actual/Potential	Project Emissions Increase
Source ID	**Source Description**	**PM Emissions (tons/yr)**		
89-0077-02	Railcar Unloading, Storage, and Handling	1.14	1.78	0.64
89-0077-05	Rubber Mixing and Remilling	5.73	11.32	5.59
89-0077-10	Boilers and Heater	1.75	6.84	5.09
	Tire Spraying (Dopers)	1.85	2.74	0.90
	Cement Spraying (PM only)	0.0037	0.0054	0.0018
	Tire Repair	0.0835	0.1240	0.0405
	Final Inspection Marking	0.0313	0.0625	0.0313
	Tire Testing	0.0010	0.0014	0.0005
	Mold Cleaning	0.038	0.075	0.037
	Inside Day Bins	0.884	1.105	0.221
	Total:	11.51	24.05	**12.54**
Source ID	**Source Description**	**PM_{10} Emissions (tons/yr)**		
89-0077-02	Railcar Unloading, Storage, and Handling	1.14	1.78	0.64
89-0077-05	Rubber Mixing and Remilling	5.73	11.32	5.59
89-0077-10	Boilers and Heater	1.75	6.84	5.09
	Tire Spraying (Dopers)	1.85	2.74	0.90
	Cement Spraying (PM only)	0.0037	0.0054	0.0018
	Tire Repair	0.0835	0.1240	0.0405
	Final Inspection Marking	0.0313	0.0625	0.0313
	Tire Testing	0.0010	0.0014	0.0005
	Mold Cleaning	0.038	0.075	0.037
	Inside Day Bins	0.884	1.105	0.221

Table 4: Pre- and Post-Modification Emissions Comparison				
		Baseline Actual	Future Actual/Potential	Project Emissions Increase
	Total:	11.51	24.05	**12.54**
Source ID	**Source Description**	**$PM_{2.5}$ Emissions (tons/yr)**		
89-0077-02	Railcar Unloading, Storage, and Handling	0.26	0.41	0.15
89-0077-05	Rubber Mixing and Remilling	1.32	2.60	1.29
89-0077-10	Boilers and Heater	1.75	6.84	5.09
	Tire Spraying (Dopers)	1.85	2.74	0.90
	Cement Spraying (PM only)	0.0037	0.0054	0.0018
	Tire Repair	0.0835	0.1240	0.0405
	Final Inspection Marking	0.0313	0.0625	0.0313
	Tire Testing	0.0010	0.0014	0.0005
	Mold Cleaning	0.038	0.075	0.037
	Inside Day Bins	0.884	1.105	0.221
	Total:	6.22	13.96	**7.75**
Source ID	**Source Description**	**VOC Emissions (tons/yr)**		
89-0077-04	Manufacturing and Material Usage	148.75	261.26	112.51
89-0077-05	Rubber Mixing and Remilling	16.94	180.66	163.72
89-0077-10	Boilers and Heater	1.25	3.02	1.77
89-0077-22	Curing Operation	38.34	104.77	66.43
	Solvent Storage Tank	0.07	0.12	0.05
	Tire Repair (does not include emissions from paint)	0.0582	0.0796	0.0264
	Final Inspection Marking (Spray Cans)	0.094	0.125	0.031
	Three New 30,000 Gallon (Max) Oil Storage Tanks	0.00	0.019	0.019
	Electron Beam Generator	0.0010	0.0015	0.0005
	Total:	205.50	550.06	**344.56**
Source ID	**Source Description**	**NO_X Emissions (tons/yr)**		
89-0077-10	Boilers and Heater	11.49	38.28	26.79
	Electron Beam Generator	1.47	2.19	0.72
	Total:	12.96	40.47	**27.51**
Source ID	**Source Description**	**CO Emissions (tons/yr)**		
89-0077-10	Boilers and Heater	19.08	46.13	27.05
	Total:	19.08	46.13	**27.05**
Source ID	**Source Description**	**SO_2 Emissions (tons/yr)**		
89-0077-10	Boilers and Heater	0.30	25.31	25.01
	Total:	0.30	25.31	**25.01**
Source ID	**Source Description**	**CO_2e Emissions (short tons/yr)**		
89-0077-10	Boilers and Heater	27,073	73,152	46,078
	Total:	27,073	73,152	**46,078**
Source ID	**Source Description**	**Lead Emissions (short tons/yr)**		
89-0077-10	Boilers and Heater	1.23E-04	1.68E-03	1.55E-03
	Total:	1.23E-04	1.68E-03	**1.55E-03**

The proposed project will result in a significant emissions increase. There are no contemporaneous reductions available for netting, therefore, the project emissions increase of each pollutant is also the net emissions increase due to the project.

Table 5: PSD Applicability Summary

Pollutant	Net Emission Increase (tons/yr)	PSD Significant Emission Rate (tons/yr)	Subject to PSD Review?
PM	12.54	25	No
PM_{10}	12.54	15	No
$PM_{2.5}$	7.75	10	No
VOC	344.56	40	**Yes**
NO_X	27.51	40	No
CO	27.05	100	No
SO_2	25.01	40	No
CO_2e	46,078	75,000	No
Lead	1.55E-03	0.6	No

As demonstrated in Table 5, the net emission increase of each pollutant, when compared to the PSD SER thresholds, indicate emissions of VOC exceed the SER. Therefore, the proposed project is PSD major for VOC.

V. Regulatory Applicability

V.1 New Source Performance Standards (NSPS)

The New Source Performance Standards (NSPS) are national emission standards that apply to specific categories of new stationary sources. As stated in the Clean Air Act Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated."

V.1.1 Small Industrial-Commercial-Institutional Steam Generating Units

40 CFR 60, Subpart Dc – *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units* (Subpart Dc) regulates each steam generating unit for which construction, modification, or reconstruction begins after June 9, 1989, and that has a maximum design heat input capacity of 100 million British thermal units per hour (MMBtu/hr) or less, but greater than or equal to 10 MMBtu/hr. As a natural gas and No.2 fuel oil-fired unit, the new boiler (with a design heat input capacity of 75.0 MMBtu/hr) is subject to the requirements of §60.42c(d) to utilize fuel oil with a maximum sulfur content of 0.5% by weight, to the requirements of §60.48c(g)(1) or (2) to record and maintain records of the amount of fuel combusted in each unit on either a daily or monthly basis, and to the requirements of §60.48c(d) to submit semiannual reports. Alternatively, the facility may elect to record and maintain records of the total amount of fuel delivered to the property during each calendar month, per §60.48c(g)(3).

V.1.2 Rubber Tire Manufacturing

40 CFR 60, Subpart BBB – *Standards of Performance for the Rubber Tire Manufacturing Industry* (Subpart BBB) regulates rubber tire manufacturing plants for which construction, modification, or reconstruction began after January 20, 1983. Tire is defined in §60.541 as any agricultural, airplane, industrial, mobile home, light-duty truck and/or passenger vehicle tire that has a bead diameter less than or equal to 0.5 meter (m) (19.7 inches) and a cross section dimension less than or equal to 0.325 m (12.8 in.), and that is mass produced in an assembly-line fashion. The diameter of the tire beads for all tires manufactured at the BA–O - Warren Plant is 22.5 in or greater. Therefore, Subpart BBB does not apply.

V.2 National Emission Standards for Hazardous Air Pollutants (NESHAP)

The Environmental Protection Agency (EPA) has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) for various industrial source categories. Sources in these categories that emit 10 tons per year or more of a single hazardous air pollutant (HAP) or 25 tons per year of total HAPs are subject to major source NESHAPs.

The proposed expansion will not result in facility-wide emissions of HAP to exceed the major source thresholds. The facility has requested limits to maintain area source status.

V.2.1 Rubber Tire Manufacturing

40 CFR 63, Subpart XXXX - *National Emission Standards for Hazardous Air Pollutants: Rubber Tire Manufacturing* (Subpart XXXX) regulates existing and new rubber tire manufacturing operations located at, or that are a part of, a major source of HAP emissions. The BATO - Warren Plant is an area source of HAP emissions and is therefore not subject to Subpart XXXX.

V.2.2 Industrial, Commercial and Institutional Boilers Area Sources

40 CFR 63, Subpart JJJJJJ - *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources* (Subpart JJJJJJ) regulates existing and new industrial, commercial, and institutional boilers located at a facility that is an area source of HAP. Subpart JJJJJJ applies to boilers located at area source facilities that burn coal, oil, biomass, or non-waste materials, but <u>not</u> to boilers that burn only gaseous fuels (including, but not limited to, natural gas, process gas, landfill gas, coal derived gas, refinery gas, hydrogen, and biogas).

The permittee has agreed to operate the proposed boiler as required to meet the definition of a gas-fired boiler per 40 CFR §63.11237. As such, the proposed boiler will not be subject to Subpart JJJJJJ.

VI. <u>Best Available Control Technology (BACT) Analysis Review</u>

Pursuant to subparagraph 1200-03-09-.01(4)(j)3 of the TAPCR, BATO is required to apply best available control technology (BACT) for emissions of VOC, since a significant net emission increase in VOC is expected as a result of this project. This requirement applies to each proposed or existing emissions unit at which an emission increase in VOC would occur as a result of a physical change or change in the method of operation of the unit. The emission sources included as part of this expansion that have potential emissions of VOC for which a BACT analysis is required are the new emissions units (new cement stations, calendars, and extruders) being added to the manufacturing and material usage operations (89-0077-04), the new emissions units (four new mixers) being added to the rubber mixing and remilling operations, (89-0077-05), the new boiler being added to the powerhouse (89-0077-10), the new tire curing trenches and curing presses being added to the tire curing operation (89-0077-22), two new tire repair stations, and three new 30,000 gallon (max) oil storage tanks.

BACT means an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed new or modified source which the Technical Secretary, <u>*on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs*</u>, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques, for control of such pollutant.

In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60 or 61. If the Technical Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to require the application of BACT. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The EPA policy memorandum dated December 1, 1987, directs applicants and permit reviewers to consider all technically feasible alternatives, including those more stringent than the BACT selection. This is referred to as the “top-down BACT analysis approach.” The Air & Waste Management Association’s New Source Review Manual (Updated edition, August 2019) summarizes the top-down BACT analysis in the following steps:

1. Identify all available control technologies.

2. Eliminate technically infeasible options.
3. Rank remaining control technologies by control effectiveness.
4. Evaluate most effective controls and document results.
5. Select BACT.

The results of the BACT analysis are summarized in Table 6. The top-down BACT analysis approach provides that all available control technologies be ranked in descending order of control effectiveness. The most effective control technology is established as BACT unless the applicant demonstrates, and the permitting authority agrees, that technical considerations, or energy, environmental, or economic impacts indicate that the most effective technology is not achievable. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on.

Pursuant to TAPCR 1200-03-09-.01(4)(b)53, BACT means an emission limitation based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed new or modified air contaminant source. Pursuant to TAPCR 1200-03-02-.01(aa), a modification is any physical change in or change in the method of operation of an air contaminant source which increases the amount of any air contaminant (to which an emission standard applies) emitted by such source or which results in the emission of any air contaminant (to which an emission standard applies) not previously emitted except that an increase in the production rate or operating hours, if such increase does not exceed the operating design capacity nor the stated production rate or operating hours stipulated on the permit of the affected source. Existing equipment will experience debottlenecking and increased utilization upon completion of the proposed project. However, this increase in annual production rates for the existing equipment would not result in emissions which would be prohibited by the current permit (Title V permit number 569874). Therefore, no physical change or change in the method of operation is occurring for the existing equipment. Accordingly, the increase in emissions from the existing equipment does not meet the definition of a modification and the existing equipment is not subject to BACT.

Table 6: Summary of VOC BACT Analysis

Emission Source	Emission Units	Emission Limit	Control Technology	Compliance Method
Source 04: Manufacturing and Material Usage	new extruders, new calendars (equipment list provided in confidential application dated x), and three new cement stations	116.08 tons during any period of 12 consecutive months	Pollution Prevention (P2)	P2 will entail developing and implementing a work practice plan to minimize VOC emissions
Source 05: Rubber Mixing and Remilling	Four new mixers	80.27 tons during any period of 12 consecutive months	P2	P2 will entail developing and implementing a work practice plan to minimize VOC emissions
Source 10: Powerhouse	Boiler 3	1.77 tons during any period of 12 consecutive months	P2	P2 will entail good combustion and maintenance practices, including annual tune-ups
Source 22: Tire Curing Operation	Two New Curing Trenches (Four new curing lines)	34.92 tons during any period of 12 consecutive months	P2	P2 will entail developing and implementing a work practice plan to minimize VOC emissions
Tire Repair (Insignificant)	Two new tire stations	0.04 tons during any period of 12 consecutive months	P2	P2 will entail documentation of industry best practices implemented to minimize VOC emissions.
Oil Storage Tanks (Insignificant)	Three new oil storage tanks (30,000 gallons or smaller, each)	0.02 tons during any period of 12 consecutive months	P2	P2 will entail documentation that the tanks are equipped with submerged fill and maintaining a light-colored tank exterior.

Under Step 1 of a criteria pollutant top-down BACT analysis, the following resources are typically consulted when identifying demonstrated and potentially applicable control technology alternatives:

- The EPA's RACT/BACT/LAER Clearinghouse (RBLC);
- EPA's Clean Air Technology Center;
- Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal and state agencies;
- Engineering experience with similar control technologies;
- Control technology vendors;
- Technical journals, reports, and newsletters.

Searches of the RBLC database were conducted to identify the emission control technologies and emission levels established by permitting authorities as BACT for units comparable to those planned for installation at the BATO - Warren Plant.

VI.1 VOC BACT Analysis Review

VI.1.1 VOC BACT Analysis – Manufacturing and Material Usage (89-0077-04)

This source consists of cement stations, calendaring, extruding, bead winding, and autoclaving operations and includes plantwide usage of cement, inks, paints, and solvents. Various chemical additives and rubber compounds are utilized in each process, depending upon the particular tire recipe. VOC and HAP are emitted from the material usage included in this source. The proposed modification is to construct additional emission units of the type described above, in order to increase the tire manufacturing capacity of the facility.

BATO reviewed the RBLC database as part of the BACT analysis for this project and found six tire manufacturing plants which had undergone BACT analysis in the database. No instances where add on control technology was required as BACT were identified for the types of emission units included in this source.

A review of their analysis is presented below.

VI.1.1.1 Identify Available Control Technologies

BATO provided the following list of technologies as being applicable for the control of VOC emissions from the calendars, extruders, and cement stations:

- Thermal Oxidation (e.g., regenerative thermal oxidizers [RTO])
- Adsorption (e.g., activated carbon tower)
- RTO plus Zeolite concentrators
- Condenser Unit
- Boilers
- Absorption (e.g., wet scrubbing)
- Alternative Materials (i.e., silane replacement)
- Work Practice Standards (Pollution Prevention [P2])

VI.1.1.2 Eliminate Infeasible Options

Thermal Oxidation (RTO): Oxidation (incineration) destroys VOC by oxidizing them to form carbon dioxide and water. RTOs are a type of thermal oxidation control technology which utilize ceramic media in order to retain heat and improve energy efficiency. RTOs have proven effective in the tire industry. The units have limited impact on the environment, function effectively in a wide range of production scenarios, and are typically the most cost-effective thermal oxidation technology. Thermal oxidation, specifically by an RTO, is considered technically feasible. BATO assumes the use of an RTO to be the most effective and economical control device due the high control efficiency and energy efficiency of the technology.

Adsorption: Adsorption is a process whereby VOC is removed from a gaseous stream by adhering to the surface of a solid medium. Activated carbon is the most commonly used adsorbent. Zeolites and polymer adsorbents are also available options. The adsorbent can be regenerated, typically by heating, or replaced. When regenerated, the desorbed VOC must be controlled. BATO notes that the use of an adsorber would result in the production of a saturated carbon adsorbent waste stream due to the tire processing oils which are unable to be removed from the carbon. Adsorber systems are most effective at input concentrations at or above 500 ppm. This renders this technology technically infeasible for all activities included in this source, except for the cement stations. The use of a regenerating zeolite adsorber in conjunction with an RTO for the cement stations is considered technically feasible and discussed further below.

RTO plus Zeolite Concentrator: The use of an adsorber (concentrator) prior to incineration is sometimes necessary to achieve a high control efficiency when the exhaust gas has a low concentration of VOC and/or a high exhaust rate. When the adsorbent reaches its adsorption capacity, it is desorbed, and the VOC which is desorbed is routed to a control device at an appropriate concentration and flow rate for optimal pollution control. RTOs are often the control device paired with concentrators. Due to the proven effectiveness of RTOs in the tire industry, a concentrator and RTO pairing is considered technically feasible for control of VOC emissions from the cement stations. This option is considered technically infeasible for control of VOC emissions from the calenders and extruders for the reasons discussed above.

Condenser Units: Condenser units are devices which convert a gas or vapor to a liquid. Devices which utilize a temperature reduction to achieve this phase change are called refrigerated condensers. Section 3 in Chapter 2 of the EPA Air Pollution Control Cost Manual indicates that refrigerated condensers are used for air pollution control when treating emissions streams with high VOC concentrations (usually >5,000 ppm). BATO has stated in the application that the emissions streams from the calenders, extruders, and cement stations are low concentration, high flow exhaust streams. Therefore, this technology is not considered technologically feasible.

Boilers: VOC laden exhaust gas may be routed to a boiler wherein the VOC is oxidized to form carbon dioxide and water. This control technique is considered technically feasible. Each boiler can accept 7,000 cfm of exhaust. Milling, calendaring, and extruding processes are vented directly inside the production area and would require a large volume of exhaust air in order to achieve a high VOC capture efficiency. The volume of exhaust air is conservatively estimated at 30,000 cfm, which exceeds the capacity of the boilers, making this option technically infeasible for control of VOC from the calenders and extruders. However, the new cement stations have a flowrate of 11,000 cfm per station, and the expected VOC concentration is higher than milling, calendaring, or extruding. Therefore, boiler control of the new cement stations is considered technically feasible.

Absorption (e.g., scrubbers): Absorption is a process whereby VOC is removed from a gaseous stream via a liquid solvent. Devices which utilize this method of control are commonly called scrubbers. There are a variety of implementations, which all seek to create contact between a scrubbing fluid and exhaust gas. The VOC in the exhaust gas is absorbed by the scrubbing fluid. The cleaned exhaust gas is emitted, and the scrubber liquid is either utilized for material recovery or disposed. BATO has not identified any absorbers/wet scrubbers which have been installed for control of VOC emissions from similar emission sources at other tire plants. BATO notes in the application that absorbers are best suited to high concentration exhaust streams and that the exhaust streams from this source are low concentration, high flow. Therefore, this control technology is deemed technically infeasible.

Alternative Materials (e.g., silane replacement): BATO states in the application that they are not aware of any alternative material to silane which can be used to produce tires which meet the quality and safety standards of BATO.

Work Practice Standards (P2): Work practice standards are work practices which focus on the minimization of emissions. VOC work practice standards that are applicable to calenders, extruders, and cement stations are practices such as storing VOC-containing materials in closed containers, using low-VOC materials where possible, promptly cleaning up spills, and minimization of cleaning with VOC containing compounds. This control technique is deemed technically feasible.

VI.1.1.3 Rank Remaining Control Technologies by Control Effectiveness

Following review of the available control technologies, thermal oxidation via RTO or boilers, with and without a concentrator system, and P2 remained as technically feasible control options. The remaining VOC control options, ranked by control effectiveness, are shown in **Table 7**.

Table 7: Ranked VOC Control Options - Calendars, Extruders, and Cement Stations

Control Option	Control Efficiency
RTO/Boiler	98%
RTO/Boiler with concentrator	95%
P2	Unquantified

A review of the energy, environmental, and economic impacts from the use of these controls are presented in the next section.

VI.1.1.4 Evaluate Most Effective Controls

Thermal Oxidation (RTO) and Boiler Economic Impact Analysis: This emission source consists of several types of emission units. The three highest emitting unit groups, cement stations, extruding, and calendaring, were evaluated. Cement stations were evaluated in the following configurations: each new cement station routed to a dedicated RTO, the three new stations routed to a single RTO with concentrator, the three new stations routed to a single boiler with concentrator, and the three new stations routed to three boilers. A concentrator would reduce the air volume sufficiently to allow a single boiler to handle three cement stations. Without a concentrator, the capture efficiency for boiler control is reduced to 85%, due to the inability of the three boilers to accommodate the entirety of the exhaust stream from the three cement stations.

The extrusion units contribute the next largest quantity of VOC emissions after the cement stations, 52.0 tons per year (total for existing and new units; new units alone will contribute 19.1 tons per year). The existing units are currently not vented to a control device. BATO states that a conservative estimate of exhaust flow needed to capture emissions from both the existing and new extruders is 30,000 scfm. The estimated control cost of abatement of VOC from the extruders with an RTO is $13,446/ton VOC.

BATO states that the next highest contribution to VOC emissions from rubber processing equipment is 20.56 tons of VOC per year from calendaring. Similar to the extruders, calendaring units are not currently vented to a control device, but emissions could be feasibly collected with an exhaust flow of 30,000 cfm. Therefore, assuming the same control cost as for the extruders, the dollar per ton control cost for calendaring can be estimated at $34,006 per ton of VOC. With a maximum VOC concentration expected from all remaining equipment at this source of 20 ppm, it can be assumed that control costs for any remaining equipment would not be economically feasible. A summary of the results of the cost analysis are presented in **Table 8**. Details of the financial evaluation for each control option may be found in Appendix B of the revised BACT analysis dated August 11, 2023.

Table 8: Cost Analysis of VOC Control Options - Calendars, Extruders, and Cement Stations

Control Scenario	Overall Control Efficiency (%)	VOC Emission Reduction (tons per year)	Annualized Control Cost ($)	Cost Effectiveness ($/ton)
Three New Cement Stations – 65.8 tons of VOC available for control				
One RTO per cement station	98%	64.5	$1,401,833	$21,723
One RTO for all stations, no concentrator	98%	64.5	$764,619	$11,855
One RTO for all stations with	95%	62.6	$799,211	$12,776

Table 8: Cost Analysis of VOC Control Options - Calendars, Extruders, and Cement Stations				
Control Scenario	**Overall Control Efficiency (%)**	**VOC Emission Reduction (tons per year)**	**Annualized Control Cost ($)**	**Cost Effectiveness ($/ton)**
concentrator				
One boiler for all stations with concentrator	95%	62.6	$921,387	$14,729
One boiler per cement station, no concentrator	80.8%	21.9	$681,627	$31,132
Extruders				
Existing and new extruders: One RTO	98%	51.0	$685,174	$13,446
Calenders				
Existing and new calendars: One RTO	98%	20.1	$685,174	$34,006

To summarize, based upon a cost per ton of VOC removal of $11,849 for the most cost-effective control scenario, BATO considers the cost of VOC capture and control to be prohibitively expensive for the cement stations. Likewise, the cost per ton of VOC removal for the extruders and calenders, which is higher than the cost per ton for the cement stations, is also considered cost prohibitive. Thus, the application of control technology is regarded as economically infeasible for control of VOC emissions from the new cement stations, extruders, and calenders.

P2 has no negative economic, environmental, or energy impacts.

VI.1.1.5 Select BACT

BATO proposed that BACT for VOC emissions from this source (which includes the new cement stations, extruders, and calenders) will be good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC materials, cleaning up spills, minimizing cleaning with VOC compounds, and establishing a VOC emission limit of 116.08 tons during any period of 12 consecutive months.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, a VOC emission limit of 116.08 tons during any period of 12 consecutive months, and good VOC work practices are established as BACT for VOC.

Compliance with this emission limitation shall be demonstrated by calculation of actual VOC emissions on a monthly and 12 consecutive month basis. Compliance with the work practice requirements shall be assured by the development and implementation of a work practice plan to minimize VOC emissions from this source.

VI.1.2 VOC BACT Analysis – Rubber Mixing and Remilling (89-0077-05)

This source consists of mixers which process raw materials into stock rubber. VOC and HAP are emitted from material usage at this source. Silane is a significant contributor to VOC emissions. PM is emitted from the transfer of raw materials to the mixers from day bins and super sacks. There are five existing mixers and four new mixers proposed for this expansion project.

The review described in Sections VI.1.1.1 and VI.1.1.2 and summarized in **Table 7** is also applicable to these operations. BATO reviewed the RBLC database as part of the BACT analysis for this project and found six tire manufacturing plants which had undergone BACT analysis in the database. BATO identified four instances where RTO control was required for operations similar to those included in this source.

VI.1.2.1 Identify Available Control Technologies

BATO provided the following list of technologies as being applicable for the control of VOC emissions from the mixers:

- Thermal Oxidation (e.g., RTO)
- Adsorption (e.g., activated carbon tower)
- RTO plus Zeolite concentrators
- Condenser Unit
- Boilers (existing)
- Absorption (e.g., wet scrubbing)
- Alternative Materials (i.e., silane replacement)
- Work Practice Standards (P2)

VI.1.2.2 Eliminate Infeasible Options

The discussion in Section VI.1.1.2 is applicable to the rubber mixing operation. In addition, BATO has identified specific challenges with utilizing most add-on control technologies with this equipment. The capture efficiency for VOC emissions from the mixers is estimated at 85% because the lower "batch out" door of each mixer has a configuration that must be open during production, and the area cannot be effectively hooded. A large amount of air would be required to collect the VOC emissions from this part of the process, resulting in a large volume of air with a small concentration of VOC. Types of VOC controls other than those listed above were considered by BATO, but those controls have not been used and proven effective in the tire production industry.

A review of the control options listed above is provided in Section VI.1.1.2, with additional relevant analysis added here as necessary.
For the reasons discussed in section VI.1.1.2, use of the following control options is considered technically feasible to control VOC emissions from the mixers:

- Thermal Oxidation (RTO)
- Boilers
- P2

For the reasons discussed in section VI.1.1.2, use of the following control options is considered technically infeasible for control of VOC emissions from the mixers:

- Adsorption: BATO noted that carbon adsorbers have not been successful for controlling VOC emissions from tire manufacturing operations because solid adsorption media are susceptible to plugging by the PM given off by the process. While the mixers are vented first to dust collectors for PM control, the tire processing oils would not be able to be removed from the carbon.
- RTO plus Zeolite Concentrator
- Condenser Units
- Absorption (e.g., scrubbers)
- Alternative Materials (e.g., silane replacement)

VI.1.2.3 Rank Remaining Control Technologies by Control Effectiveness

Following review of the available control technologies, thermal oxidation (RTO or boiler) with and without concentrators and work practice standards remained as technically feasible control options. The remaining VOC control options, ranked by control effectiveness, are shown in **Table 9**.

Table 9: Ranked VOC Control Options – Rubber Mixing and Remilling

Control Option	Control Efficiency
RTO/Boiler	98%
RTO/Boiler with concentrator	95%
P2	Unquantified

A review of the energy, environmental, and economic impacts from the use of these controls are presented in the next section.

VI.1.2.4 Evaluate Most Effective Controls

Thermal Oxidation (RTO) Economic Impact Analysis: BATO evaluated the economic impact of using an RTO in various configurations: four mixers with four RTOs, four mixers with two RTOs, two mixers with two RTOs with all silane usage occurring in those two mixers, four mixers with one RTO and concentrator system, and four mixers plus two existing mixers with one RTO and concentrator system. Utilization of boilers for control for two mixers was also considered. BATO notes that the facility currently has no restrictions on silane usage, and that such restrictions would limit the facility's ability to meet customer demand and would constrain the overall production capacity of the facility. However, operational flexibility concerns aside, BATO reviewed the cost of the configurations mentioned above. A summary of the results of this analysis are presented in **Table 10**. Details of the financial evaluation may be found in Appendix B of the revised BACT analysis dated August 11, 2023.

Table 10: Cost Analysis of VOC Control Options – Rubber Mixing and Remilling

Control Scenario	Overall Control Efficiency (%)[1]	VOC Emission Reduction (tons per year)	Annualized Control Cost ($)	Cost Effectiveness ($/ton)
Four new mixers, each with an RTO	83.3%	66.9	$3,286,468	$40,912
Four new mixers, two RTOs	83.3%	66.9	$2,471,350	$36,959
Two mixers, one RTO, all silane is processed in the two mixers	83.3%	138.5	$1,235,675	$8,922
Four new mixers, one RTO with concentrator system	80.8%	64.8	$833,667	$12,861
Four new mixers and two existing mixers, RTO with concentrator system	80.8%	97.2	$1,188,241	$12,221
Two new mixers, boiler control	20.9%	8.43	$341,740	$40,535

1. Capture efficiency is estimated at 85% due to the fact that the lower "batch out" door of the mixer has a configuration that must be open for production. This design cannot be effectively hooded. The capture efficiency for boiler control is 22% based on the limited portion of mixer exhaust that the boilers can accommodate.

The lowest cost per ton of VOC removal, $8,922, is obtained when evaluating the use of one RTO to control emissions from two mixers when all silane is processed in those two mixers. As noted above and in the BACT analysis provided by the facility, there are currently no restrictions on how the mixers are used, or what type of rubber can be processed in each mixer. The capability to mix any type of rubber compound in any mixer is necessary for BATO to be able to achieve the purpose and the capacity proposed for this expansion project. As such, the lowest cost per ton operating scenario is not considered feasible for this project. Additionally, the second lowest cost per ton of VOC removal, $12,221, is considered by BATO to be prohibitively expensive. Thus, the application of control technology is regarded as economically infeasible for control of VOC emissions from the new mixers.

P2 has no negative economic, environmental and energy impacts.

VI.1.2.5 Select BACT

BATO proposed that BACT for VOC emissions from this source be good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC materials, cleaning up spills, and minimizing cleaning with VOC compounds, and establishing a VOC emission limit of 80.27 tons during any period 12 consecutive months.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, a VOC emission limit of 80.27 tons during any period of 12 consecutive months and good VOC work practices are established as BACT for VOC.

Compliance with this emission limitation shall be demonstrated by calculation of actual VOC emissions on a monthly and 12 consecutive month basis. Compliance with the work practice requirements shall be assured by the development and implementation of a work practice plan to minimize VOC emissions from this source.

VI.1.3 VOC BACT Analysis – Tire Curing (89-0077-22)

This source consists of multiple trenches where green tires are cured. VOC and HAP are emitted from the tires during the curing process. The proposed modification is to construct two additional tire curing trenches. Each tire curing trench has two curing lines.

The review described in Sections VI.1.1.1 and VI.1.1.2 and summarized in **Table 7** is also applicable to these operations. BATO reviewed the RBLC database as part of the BACT analysis for this project and found six tire manufacturing plants which had undergone BACT analysis in the database. No instances where add on control technology was required as BACT were identified for the types of emission units included in this source.

VI.1.3.1 Identify Available Control Technologies

BATO provided the following list of technologies as being applicable for the control of VOC emissions from the new tire curing trenches:

- Thermal Oxidation (e.g., RTO)
- Adsorption (e.g., activated carbon tower)
- RTO plus Zeolite concentrators
- Condenser Unit
- Boilers (existing)
- Absorption (e.g., wet scrubbing)
- Work Practice Standards (P2)

VI.1.3.2 Eliminate Infeasible Options

The discussion in Section VI.1.1.2 is also applicable to the tire curing operation. A review of the control options listed above is provided in Section VI.1.1.2, with additional relevant analysis added here as necessary.

The highest VOC concentration from the tire curing operations is estimated by BATO to be less than 20 ppm, which is the threshold at which add-on controls are considered feasible. At such a low concentration, the following control technologies are considered technically infeasible for control of VOC emissions from the tire curing operation:

- Thermal Oxidation (RTO)
- Adsorption
- Condenser Units
- Absorption (e.g., scrubbers)
- Boilers (existing)

RTO plus Zeolite Concentrator: For the reasons discussed in Section VI.1.1.2, the use of an RTO with a concentrator system has proven successful for control of VOC emissions in the tire industry. The most feasible option for add-on controls for the tire curing operation is the use of a single RTO and zeolite concentrator system with three concentrator wheels for each new tire curing trench. The use of an RTO with zeolite concentrator system was determined to be technically feasible for control of VOC emissions from the tire curing operation.

P2: For the reasons discussed in Section VI.1.1.2, P2 is considered technically feasible for control of VOC emissions from the tire curing operation.

VI.1.3.3 Rank Remaining Control Technologies by Control Effectiveness

Following review of the available control technologies, only thermal oxidation (RTO) with a concentrator system and P2 remained as technically feasible control options. The remaining VOC control options, ranked by control effectiveness, are shown in **Table 11**.

Table 11: Ranked VOC Control Options – Tire Curing	
Control Option	**Control Efficiency**
RTO with concentrator	95%
P2	Unquantified

A review of the energy, environmental, and economic impacts from the use of these control options are presented in the next section.

VI.1.3.4 Evaluate Most Effective Controls

Thermal Oxidation (RTO) Economic Impact Analysis: BATO evaluated the economic impact of using an RTO with concentrators set up for each new curing trench. The results of this analysis are presented in **Table 12**. Details of the financial evaluation may be found in Appendix B of the revised BACT analysis dated August 11, 2023.

Table 12: Cost Analysis of VOC Control Options – Tire Curing				
Control Scenario	**Overall Control Efficiency (%)**	**VOC Emission Reduction (tons per year)**	**Annualized Control Cost ($)**	**Cost Effectiveness ($/ton)**
RTO with concentrator system, one for each new curing trench	95%	33.2	$2,696,434	$81,277

To summarize, based upon a cost per ton of VOC removal of $81,277, BATO considers the cost of VOC capture and control to be prohibitively expensive. Thus, the application of this control technology is regarded as economically infeasible for control of VOC emissions from the tire curing operation.

P2 has no negative economic, environmental, and energy impacts.

VI.1.3.5 Select BACT

BATO proposed that BACT for VOC emissions from the tire curing operation be good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC materials, cleaning up spills, and minimizing cleaning with VOC compounds, and establishing a VOC emission limit of 34.92 tons during any period of 12 consecutive months.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, a VOC emission limit of 34.92 tons during any period of 12 consecutive months and good VOC work practices are established as BACT for VOC.

Compliance with this emission limitation shall be demonstrated by calculation of actual VOC emissions on a monthly and 12 consecutive month basis. Compliance with the work practice requirements shall be assured by the development and implementation of a work practice plan to minimize VOC emissions from this source.

VI.1.4 VOC BACT Analysis – Powerhouse (89-0077-10)

This source consists of two existing 75 MMBtu/hr boilers and one 10.3 MMBtu/hr hydronic heater. The proposed modification is the addition of one 75 MMBtu/hr boiler. All units primarily utilize natural gas but are capable of utilizing No. 2 fuel oil as a backup fuel. VOC emissions from the boilers are a result of incomplete combustion of natural gas and No. 2 fuel oil. It is noted that the boilers at the BATO - Warren Plant will be operated as gas-fired boilers under 40 CFR 63, Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources, which will limit the use of No. 2 fuel oil in the boilers to periods of natural gas curtailment, gas supply interruption, startups, or during periodic testing, maintenance, or operator training on liquid fuel.

BATO reviewed the RBLC as part of the BACT analysis for recent determinations for small (<100 MMBtu/hr) industrial gas-fired boilers.

VI.1.4.1 Identify Available Control Technologies

The following technologies were identified by BATO for control of VOC from the new boiler.

- Catalytic oxidation
- Clean fuel and good combustion practices

VI.1.4.2 Eliminate Infeasible Options

Catalytic Oxidation: Catalytic oxidation is a post-combustion control technology which promotes the oxidation of CO to CO_2 and VOC to CO_2 and water via a catalyst. These devices are typically operated between 500°F and 1250°F. Operating temperatures that are too low result in a low control efficiency and temperatures that are too high can result in catalyst damage. The exhaust from the proposed boiler would require preheating for efficient VOC control. This control technology is considered technically feasible.

Good Combustion Practices: The use of good combustion practices optimizes combustion in the natural gas combustors. Adequate temperature and oxygen are required to ensure complete combustion occurs which will minimize CO emissions. Good combustion practices are considered technically feasible.

VI.1.4.3 Rank Remaining Control Technologies by Control Effectiveness

Both control technologies identified were determined to be technically feasible. Those control options, ranked by control effectiveness, are shown in **Table 13**.

Table 13: Ranked VOC Control Options – Powerhouse

Control Option	Control Efficiency
Catalytic oxidation	50%
Good combustion practices	Unquantified

A review of the energy, environmental, and economic impacts from the use of this control are presented in the next section.

VI.1.4.4 Evaluate Most Effective Controls

Catalytic Oxidation Economic Impact Analysis: BATO evaluated the economic impact of using catalytic oxidation for the new boiler. The control cost was found to be $45,393 per ton of VOC reduced. Thus, the application of this control technology is regarded as economically infeasible for control of VOC emissions from this source. Details of the financial evaluation may be found in the Step 2 of the revised BACT analysis dated August 11, 2023.

Clean fuel and good combustion practices have no negative economic, environmental and energy impacts.

VI.4.1.5 Select BACT

BATO proposed that BACT for VOC emissions from this source be the use of clean fuels and good combustion practices, including annual tune ups, and establishing a VOC emission limit of 1.77 tons during any period of 12 consecutive months.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, a requirement to use only natural gas and No. 2 fuel oil, a requirement to perform annual tune ups, and a VOC emission limit of 1.77 tons during any period of 12 consecutive months is established as BACT for VOC.

Compliance with the VOC emission limitation and the good combustion practices shall be assured by fuel usage records and tune-up records.

VI.1.5 VOC BACT Analysis - Insignificant Emission Units

The proposed project includes several emission units with low uncontrolled emissions which would not typically need to be included in a Title V permit. In lieu of a full "top-down" analysis, abbreviated BACT analyses were performed, including a comparison to RBLC search results, when available. The following existing activities which have emissions of VOC will undergo the addition of new equipment due to the proposed expansion project.

VI.1.5.1 Tire Repair

Small amounts of rubber are removed by grinding and are replaced with uncured rubber. These areas are then spot cured. VOC is emitted from the rubber grinding, usage of tire repair paint, and spot curing. Additional equipment to perform this operation is included in this expansion project. For the new equipment, BATO proposes best industry practices to minimize VOC emissions from this activity and a VOC limit of 0.04 tons during any period of 12 consecutive months.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, best industry practices and a VOC limit of 0.04 tons during any period of 12 consecutive months is established as BACT for VOC.

Compliance with this emission limit and work practice requirement shall be assured by calculating actual or potential emissions from this source and maintaining documentation of industry best practices utilized for this source.

VI.1.5.2 Oil Storage Tanks

Three oil storage tanks with a capacity no greater than 30,000 gallons, would be added as part of this expansion project. BATO proposed submerged fill, good work practices, light-colored tank exteriors, and a VOC emission limit of 0.02 tons during any period of 12 consecutive months (total for all three tanks) as BACT.

> Pursuant to TAPCR 1200-03-09-.01(4)(j)3, good work practices, submerged filling, a light-colored tank exterior, and a VOC emission limit of 0.02 tons during any period of 12 consecutive months are established as BACT for VOC.

Compliance with this emission limit and work practice requirements shall be assured by maintaining documentation of work practice standards which are utilized to minimize emissions from this activity, documentation that these tanks are installed with submerged fill, and by maintaining a light-colored exterior.

VII. Air Quality Analysis

VII.1 Introduction and Project Overview

This section of the PSD Analysis describes the assessment of ambient impacts resulting from the increase in emissions from the proposed permitting action (installation of new equipment and increased utilization of existing equipment).

The tire manufacturing facility in Warren County is about 3.2 miles northeast of downtown Morrison and about 6.7 miles southwest of downtown McMinnville off State Route 55. The facility is about 62 miles southeast of downtown Nashville, Tennessee and about 52 miles north-northwest of downtown Chattanooga, Tennessee. The area is considered a Class II area and is located near the western foot of the Cumberland plateau in Middle Tennessee. The closest Class I area is the Mammoth Cave National Park (MCNP) in south central Kentucky, which is located approximately 164 km (101.8 miles) to the north of the facility. **Figures 1** and **2** show the location of the BATO - Warren Plant.

Figure 1 – Bridgestone Americas Tire Operations – Warren Plant

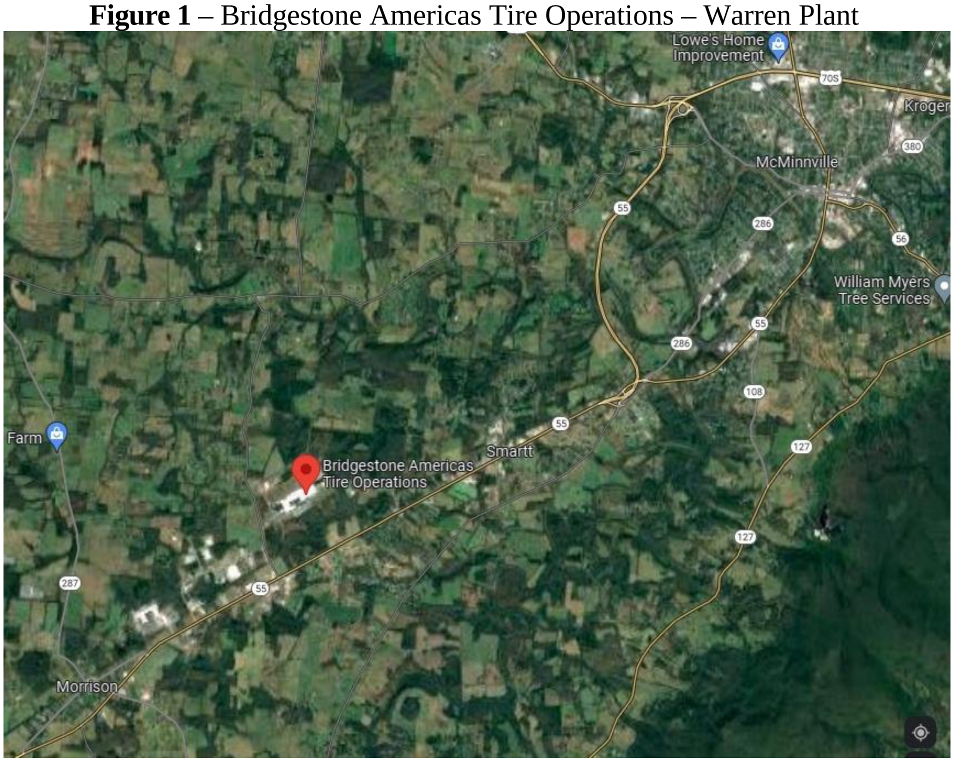
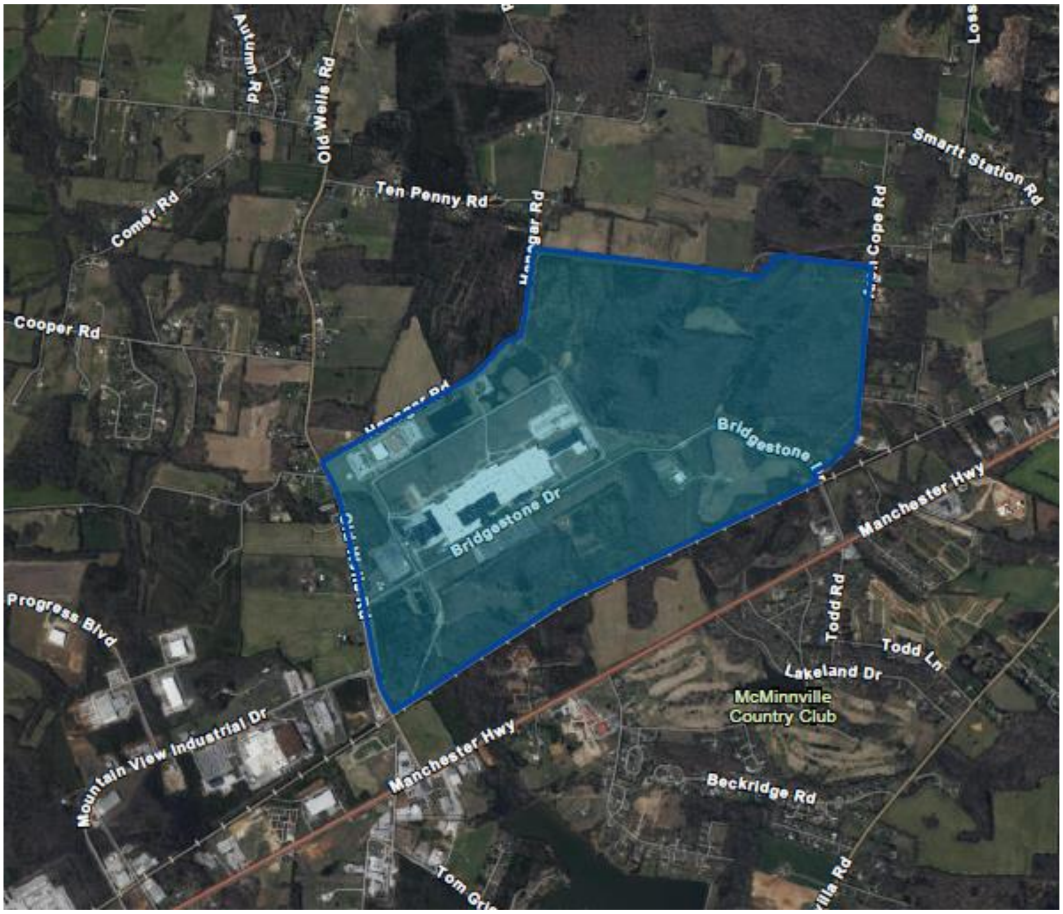


Figure 2 – Bridgestone Americas Tire Operations – Warren Plant at 725 Bridgestone Dr. in Morrison, TN



This analysis evaluated emissions of the criteria pollutants regulated under the Prevention of Significant Deterioration (PSD) regulations of 40 CFR 52.21. The criteria pollutant analysis was conducted to ensure that the proposed project will not threaten any National Ambient Air Quality Standard (NAAQS) or increments for all criteria pollutants proposed to be emitted above the PSD thresholds of 40 CFR 52.21(b)(23).

Table 5 (see Section IV) shows the net emissions increases from the project compared to the PSD applicability levels for those pollutants emitted at the facility, which require an initial modeling analysis of the facility's projected emissions. Emissions greater than the applicability level necessitate preliminary modeling analyses for those pollutants. As required by the PSD regulations, after it is determined that a facility has significant impacts, a typical air quality impact assessment may consist of some or all the following steps:

1. Determination of the Significant Impact Are (SIA), if any, for each pollutant with a Class II Significant Impact Level (SIL)
2. monitoring *de minimis* analysis for the proposed emission increase.

Also, when proposed new impacts are significant:

3. a comprehensive PSD increment consumption analysis for the surrounding Class II area, and any Class I Areas close enough to have significant impacts,
4. a comprehensive Ambient Air Quality Standards impact analysis, and
5. an additional airshed impact assessment of the effects on Visibility, Soils, Vegetation, Associated Growth, and Nonattainment Areas, as well as Class I area Air Quality Related Values (AQRVs), if applicable.

The emission rate of PM_{10} is below the significant emission rate (SER) of 15 tons/yr for PSD applicability, and it is also below the SER threshold for total or filterable PM of 25 tons/yr, while $PM_{2.5}$ emissions are below the SER of 10 tons/yr. Also, since emissions from the proposed facility processes are below the respective SERs for NO_X and SO_2, significant secondarily formed $PM_{2.5}$ is not an anticipated air pollutant. Hence, all forms of PM may be considered below the SER thresholds for PM, which makes further PM analysis unnecessary for this permit application.

On the other hand, since the emission rate of VOC is above the SER of 40 tons/yr for PSD applicability, EPA guidance recommends that proposed emission increases of both VOC and NO_X be used to estimate ozone (O_3) impacts using Modeled Emission Rates for Precursors (MERPs), even though the emission rate for NO_X is below the SER (40 tons/yr).

Since this facility is only a major PSD source for VOC, many of the typical ambient PSD analysis steps involving refined modeling with the latest version of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) gaussian dispersion model were unnecessary for this analysis. For this case, only an analysis using MERPs was necessary to evaluate the facility's impact on O_3 creation from the sources proposed increases in VOC and NO_X emissions.

VII.2 Class II Modeling: Single-Source Impact Analysis

The following sections summarize the methodology used to evaluate the facility's air quality impacts in Class II areas. The analysis described was performed in accordance with the EPA "Guideline on Air Quality Models" (GAQM, contained in 40 CFR Part 51, Appendix W) (EPA, 2017a), the New Source Review (NSR) Workshop Manual (EPA, 1990), all applicable EPA clarification memorandums and guidance documents, and direction and regulatory guidance provided by the TDEC and EPA Region IV. The modeling analysis focused on demonstrating that the ambient impact of proposed emissions from the BATO - Warren Plant expansion project will be in compliance with all applicable NAAQS and PSD Class II increments.

VII.2.1 Dispersion Modeling Methodology

Since VOC emissions are the target of this analysis, EPA's work to define a screening methodology to evaluate precursor emission impacts on O_3 formation using EPA's work with photochemical grid modeling (PGM) methods was relied on for this analysis, instead of using the AERMOD model, which is typically used to determine predicted impacts in the Class II area surrounding the facility.

In December 2016, the EPA developed a simple screening methodology to estimate single source impacts on secondary pollutants which they described as Modeled Emission Rates for Precursors or MERPs. MERPs reflect levels of increased precursor emissions that are not expected to cause a significant contribution to O_3 for PSD applications. A MERP can relate:

- VOC emissions to O_3; and
- NO_X emissions to O_3.

MERPs modeling methods are intended to conservatively estimate secondary pollutant impacts, in what is also termed a Tier 1 screening analysis, to demonstrate ambient compliance before a more refined and resource intensive Tier 2 analysis, using detailed photochemical grid modeling, is necessary.

The EPA December 2016 guidance memorandum provided a framework on how to develop source-specific or site-specific MERPs. The guidance document did not endorse a specific MERP value, though it did provide illustrative MERPs from the EPA's modeling of two hypothetical sources in various locations across the United States.

EPA's initial 2016 MERPs guidance memorandum was finalized by EPA in April of 2019. Tennessee has also provided more customized MERPs guidance for sources in Tennessee since 2019. According to EPA and Tennessee guidance, sources are required to estimate both the impacts of primarily emitted and secondarily formed pollutants as part of the PSD program. This is normally done using a Tier 1 MERPs analysis first, and if a Tier 1 analysis fails to demonstrate ambient compliance, a Tier 2 analysis using photochemical grid modeling techniques may be used, if necessary.

A conservative Tier 1 screening for secondary impacts due to precursor pollutants for O_3 was conducted using Tennessee's guidance for use of MERPs. Since there are no PSD increments for O_3, the analysis was limited to testing compliance with the NAAQS and corresponding Significant Impact Level (SIL) for O_3.

VII.2.2 Assessment of Secondary Pollutant Impacts

EPA guidance for permit modeling projects that trigger NSR review must consider secondarily formed impacts along with primary emission impacts. Since O_3 is not a primary pollutant, but instead generated from precursor pollutants, the project emissions increase was evaluated for secondary O_3 formed from both precursors: NO_X and VOC.

The BATO - Warren Plant project triggered major NSR for VOC, so EPA and TDEC guidance requires consideration of O_3 formation from both VOC emissions as well as NO_X emissions.

The Federal guidelines for secondarily formed pollutant impact assessment describe the following two-tiered approach:

1. Tier 1 involves using known relationships between precursor emissions and a source's impacts to qualitatively assess the impact of O_3 and secondary $PM_{2.5}$ formation.
2. Tier 2 requires a more detailed analysis and could involve application of a reactive pollutant model to determine the impacts.

EPA (EPA 2021b) published draft guidance for an approach to Tier 1 demonstrations based on MERPs. BATO used MERPs guidance, and other qualitative factors, to evaluate the project's potential O_3 impacts with respect to the NAAQS.

Per the TDEC MERPs Guidance, "once either one of the precursor pollutants to $PM_{2.5}$ or O_3 triggers an analysis because their emissions are above the PSD SER, then emissions of the other precursor pollutant must be included in the analysis to determine the synergistic impact that both pollutants have together, even though the other pollutant's emissions may fall below the SER."

A MERPs analysis was conducted to demonstrate that the project would not be expected to contribute significantly to concentrations of O_3, as shown in the sections below. Conservative estimates of O_3 produced from the project were simply compared to the O_3 SIL.

VII.2.3. Ozone Assessment

EPA MERPs guidance provides modeling results representing the maximum downwind O_3 concentrations due to NO_X and VOC emissions from hypothetical sources. EPA conducted photochemical modeling of hypothetical sources using emission rates of 500, 1,000, and 3,000 tons/yr of both NO_X and VOC for various locations throughout the United States.

TDEC's MERPs Guidance (TDEC, 2019) was developed based on an in-depth technical review of the EPA's hypothetical source modeling and resultant MERPs (at the time) as they pertain specifically to sources and O_3 formation phenomena in the State of Tennessee. TDEC identified the most conservative (lowest) MERPs values by precursor (NO_X and VOC) and pollutant to establish "default" MERPs values for PSD applicants in Tennessee. The default MERPs values provided in **Table 14** are the most conservative values for hypothetical sources and can be used for Tier 1 demonstrations in Tennessee without further justification.

Table 14: Default MERPs Values (tons/yr) for Tennessee PSD Applications

Precursor	8-hour O_3
NO_X	156
VOC	1,542

However, as an even more conservative estimate, BATO selected the lowest MERPs values for any source in the Ohio Valley, Southern or Southeastern United States from EPA's MERPs guidance. These emission levels represent the lowest emission rates that have not created a significant impact on O_3 concentrations across these areas, including Tennessee, based on the EPA's latest MERPs study. Hence, if the proposed BATO – Warren Plant expansion has emissions lower than the lowest emitting modelled source, which has proven not to cause a significant impact, then the BATO – Warren Plant expansion will not cause a significant impact on O_3.

MERPs values derived from the EPA model results for the "Lowest, median, and highest illustrative MERP values (tons per year) by precursor, pollutant and climate zone" may be found in Table 4-1 of EPA's memorandum titled: "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program" and dated April 30, 2019. **Table 15** shows the lowest MERPs values for 8-hr O_3 per pollutant. These values were extracted from the worst-case scenarios of stack release height (high or low), emissions category (500, 1,000 or 3,000 tons/yr), and location.

Table 15: Lowest MERPs Values (tons/yr), 8-hr O_3 Ohio Valley Climate Zone

Precursor	8-hour O_3
NO_X	126
VOC	1,159

Using Tennessee's MERPs guidance, the VOC net emission increase shown in **Table 5** (344.56 tons/yr) is compared to the lowest MERP value of 1,159 tons/yr, as shown in **Table 15**. These values, along with 35.59 tons/yr of NO_X emissions from **Table 5** and the lowest MERP value for NO_X of 126 tons/yr (shown in **Table 15**), can be used to conservatively estimate the impact of the proposed increase in comparison to the EPA SIL for O_3.

VII.2.4 Single-Source Impact Assessment Results

Summary results for each significantly emitted pollutant and averaging time.

O_3 – The NAAQS for O_3 is 70 parts per billion (ppb), which equates to 140 micrograms per cubic meter ($\mu g/m^3$), for an 8-hour average. The SIL for O_3 is 1 ppb. Since O_3 is a secondary pollutant formed in the atmosphere by precursor VOC and NO_X pollutants, the BATO – Warren Plant expansion was evaluated using single source MERPs methodology to demonstrate that the proposed expansion will not cause or contribute to a violation of the NAAQS for O_3.

The secondary O_3 impact assessment is compared to the established SIL for O_3 of 1 ppb. The MERPs values for the Ohio Valley Climate Zone (**Table 15**) are used in the following equation provided in the TDEC guidance[1] to determine if the emission increases from the proposed project at BATO – Warren Plant will result in secondary impacts that are above the SIL.

$$\frac{EMIS\_NOx}{MERP\_NOx} + \frac{EMIS\_VOC}{MERP\_VOC} < 1$$

For the Class II significant impact analysis, the maximum predicted impact was compared to the only pertinent PSD Class II SIL, which was the SIL for O_3. The impacts for the Tier 1 secondary pollutant analysis scenario are summarized below.

Since the source does not emit primary O_3 but emits both precursors to secondary O_3 formation, the analysis centers around the two precursors VOC and NO_X. Using the equation above, the MERPs values provided in **Table 15**, and the VOC and NO_X values provided in **Table 5**, the sum of the computed ratios for VOC and NO_X is less than one as seen in the following calculation.

$$\frac{27.51\ tons/yr\ of\ NOx}{126} + \frac{344.56\ tons/yr\ of\ VOC}{1{,}159} = 0.218 + 0.297$$

$$0.218 + 0.297 = 0.515$$

$$0.515 < 1$$

[1] TN Guidance on the Use of EPAs MERPs to Account for Secondary Formation in Tennessee_11222019.pdf

Based on the MERPs calculation, the net emission increase of VOC from the proposed expansion at the BATO – Warren Plant would be expected to have an impact less than the SIL of 1 ppb for O_3. As a result, any further cumulative analysis for VOC is unnecessary to approve the company's ambient assessment for VOC.

Additionally, since the predicted O_3 value is less than the threshold value of 1, the use of a background O_3 concentration in a more refined cumulative evaluation for O_3 (described on page 13 of the Tennessee MERPs guidance) is also unnecessary. With this said however, since the background would be 60 ppb and the NAAQS is 70 ppb, any impact as low as the 1 ppb SIL would not be expected to threaten air quality in the area (i.e., 60 + 0.58 = 60.58 is still less than 70 ppb).

VII.4 Class I Area Ambient Air Quality Impact Assessment

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. Analyses to support the PSD application for the BATO – Warren Plant Class I area ambient air quality impact assessment include the following:

1. Determination of the facility potential pollutant emission quantities relative to PSD significant emission rates as defined in PSD rules (40 CFR 52.21).

2. Determination of the source location and distance within 300 km of any Class I area. Facility impacts at Class I areas located beyond 300 km from the PSD source are considered insignificant.

3. Determination of compliance with the Federal Land Manager (FLM) AQRVs in addressing regional haze visibility and acidic deposition.

4. Determination of whether facility impacts at Class I areas located within 300 km from the PSD source are considered significant. If so, a determination of compliance with the EPA's NAAQS and PSD increments for those triggered criteria pollutants that have Class I area increments.

BATO completed the first two steps above by identifying which pollutant increases were significant and which Class I areas were within 300 km of the facility. The company provided discussion of the impact the proposed expansion would have on the Class I AQRVs and on the Class I SILs in Section IV of their application dated June 21, 2023.

Correspondence between the Division and the FLMs indicated that there would be no significant impact to AQRVs in the Class I areas within 300 km of the source. The company's ambient analysis also demonstrates that there is no significant impact to Class I increment, or any of the NAAQS standards at these areas.

VII.4.1 Initial Screening Criteria for AQRVs

PSD Class I areas are designated in 40 CFR Part 81 as areas of special national or regional value from a natural, scenic, recreational, or historic perspective. The PSD Class I areas that are most proximate to the project site are mandatory Federal Class I areas, which include the following areas in existence on August 7, 1977:

- International parks.
- National wilderness areas which exceed 5,000 acres in size.
- National memorial parks which exceed 5,000 acres in size; and
- National parks which exceed 6,000 acres in size.

These areas are administered by the National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), or the U.S. Forest Service (USFS). These Federal Land Managers (FLM) have the authority and responsibility to protect AQRVs in Class I areas, and to consider, in consultation with the permitting authority, whether a proposed major emitting facility will have an adverse impact on such values. Class I AQRVs for which PSD modeling is typically conducted include visibility impairment, O_3 effects on vegetation, and effects of sulfur and nitrogen deposition on soils and surface waters.

Class I area impact analyses consist of:

- An air quality impact analysis,
- A visibility impairment analysis, and
- An analysis of impacts on other AQRVs such as impacts to flora and fauna, water, and cultural resources.

The FLMs developed an initial screening criteria, Q/D, to determine if sources greater than 50 km away from a Class I area need to perform any further Class I AQRV impact analyses. The Q/D ratio is calculated by summing the annual SO_2, NO_X, PM_{10}, and sulfuric acid (H_2SO_4) emissions (in tons per year, based on 24-hour maximum allowable emissions and adjusted as if the source were operated for 8,760 hours per year), then dividing by the distance (in kilometers) to the nearest Class I area. If the Q/D value is less than or equal to 10, the source is considered to have negligible impacts on AQRVs in the Class I area and no further analyses are needed.

The following Class I areas are located within 300 km of the facility (shown with the approximate distance to the facility listed):

- Cohutta Wilderness Area (~ km)
- Mammoth Cave National Park (~ 164 km)
- Joyce Kilmer-Slickrock Wilderness Area (~170 km)
- Great Smoky Mountain National Park (~172 km)
- Sipsey National Wilderness Area (~ 197 km)

The Class I AQRV analysis was prepared in accordance with the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010) and utilizing the Q/D screening criteria described above. A summary of the AQRV analysis for the Class I Areas of concern can be found in **Table 16**.

The total of all AQRV-impairing emissions which could impact Class I areas, including PM_{10}, SO_2, NO_X, and H_2SO_4, is approximately 776.0 tons/yr.

Table 16: Q/D ratios for Class I Areas within 300 km of BATO – Warren Plant

Class I Area	D (km)	Q/D
Cohutta Wilderness Area	134.4	5.77
Mammoth Cave National Park	163.9	4.73
Joyce Kilmer-Slickrock Wilderness Area	170.2	4.56
Great Smoky Mountain National Park	172.3	4.50
Sipsey Wilderness Area	197.4	3.93

The Q/D ratios for each of the Class I Areas are well below the threshold of 10; therefore, it is presumed there are no adverse impacts from the proposed project, and no further analysis is required.

VII.4.2 Class I SILs Analysis

Since there is no SIL for VOC, other than a MERPs analysis for O_3 to compare predicted O_3 impacts to the O_3 SIL, there is no requirement to conduct a Class I SILs analysis. Since the MERPs analysis above indicated that impacts would be significantly less than the SIL for O_3 in any Class II area in Tennessee, any impacts at greater ranges to the Class I areas would also be expected to be less than the O_3 SIL.

VIII. Additional Impacts Analysis

PSD applies to new major sources or major modifications at existing sources located in an area where the air quality is classified as attainment (or unclassifiable) with the NAAQS for pollutants emitted from the proposed project. BATO – Warren Plant is a major source of VOC, a precursor to O_3. BATO – Warren Plant is located in the city of Morrison, county of Warren in the state of Tennessee, which is designated attainment for O_3.

A PSD major source subject to PSD review is required to conduct an air quality analysis and an additional impacts analysis, among other requirements. Pursuant to 40 CFR §52.21(o), the additional impacts analysis consists of three parts: growth analysis, soils and vegetation impacts analysis, and visibility impairment analysis. Each of these analyses is addressed below.

VIII.1 Growth Analysis The impact on air quality resulting from any commercial or industrial growth associated with this project was evaluated. The purpose of the growth analysis is to (1) predict how much new growth associated with the proposed project is likely to result in emissions and then (2) to estimate the emissions that will result from the associated growth.

The proposed project adds capability to produce more tires and will result in a modest increase in the number of employees at the plant. BATO plans to follow its normal practice of hiring from the existing workforce in the local area. BATO expects no measurable impact on air quality from growth in local employment associated with this project.

The proposed project will also result in a modest increase in transportation activities, primarily due to the flow of materials to the plant and shipment of tires from the plant. Carbon black will be mainly received via railcar. The remaining materials are received via truck transportation, on paved roadways. Shipments are also made via truck transportation on paved roadways. BATO expects that the modest increase in transportation activities will have negligible impact to ambient air quality.

Construction activities associated with the proposed project will be temporary. The construction activities to build the expansion necessary to contain the new units will principally consist of temporary placement of modular construction offices, routine building construction activities, and equipment installation. These activities will result in negligible impacts to ambient air quality.

As a result, negligible additional emissions are associated with the anticipated modest growth associated with the proposed project.

VIII.2 Soils, Vegetation, and Near-field Visibility Analysis

Per the requirements of 40 CFR Part 52.21(o), BATO is required to evaluate the potential impairment to visibility, soils and vegetation that could occur because of the proposed project. BATO must also address the potential air quality impacts predicted for the area as a result of general commercial, residential, industrial, and other growth associated with the source or modification. Discussions regarding these potential additional impacts are provided below.

VIII.2.1 Class II Area Visibility Impairment Analysis

The visibility impairment analysis addressed here is distinct from the potential need for a visibility analysis required for Class I areas. Since BATO – Warren Plant is a VOC source that impacts O_3 which is the transparent gaseous component of smog, then no visible impact is expected from this project. No further visibility evaluation using predictive modeling is warranted.

VIII.2.2 Soils and Vegetation Analysis

PSD regulations require an analysis to assess the potential impacts to soils and vegetation. The analysis evaluates the maximum predicted short-term concentrations for the proposed project relative to the EPA-recommended screening concentrations (see A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals [EPA, 1980]). The impacts affecting soils and vegetation are from SO_2, NO_X, and H_2S, pollutants which have potential to acidify soils and deposit on foliage, but there would be no impacts from VOC on these resources.

IX. Conclusions and Conditions of Approval

The proposed PSD project has an emission potential for VOC of more than the significant PSD level at maximum operating rate and maximum hours of operation. It is, therefore, a major source of criteria pollutants and subject to review under the regulations for the Prevention of Significant Deterioration contained in 1200-03-09-.01(4). The proposed emission limitations and pollution prevention procedures satisfy the requirement to apply BACT as required by the PSD regulations. The BACT requirements are incorporated into the permit to be issued for the proposed modification. The proposed changes will not result in ambient impacts that would exceed any NAAQS or PSD Increments and will not cause or contribute to adverse impacts on AQRVs in nearby Class I areas.

After review of the information submitted with the PSD application, it is concluded that the proposed modification qualifies for approval, subject to the terms and conditions of the proposed PSD construction permit (Appendix B).

APPENDIX A

Application for Proposed PSD Construction Permit

A copy of the application was provided electronically to EPA.
An electronic copy of the application is available on the Air Pollution Control Permits & Inspections Data Viewer

APPENDIX B

Draft PSD Construction Permit 981102

APPENDIX C

Emission Summaries for PSD Construction Permit 981102

Source 89-0077-02
Railcar and Trailer Unloading, Storage, and Handling

Permit Number: 981102

Source Status: New☐ Modification☐ Expansion☒ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☒ NSPS☐ NESHAPs☐ **Previous Permit Number:** Construction ______ Operating 569874

Pollutant	Pounds/Hour			Tons/Year				Date of Data	Applicable Standard TAPCR 1200-03-
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change		
PM/PM_{10}	3.91	3.91	3.91	1.78	1.78	1.78	-33.70	6/21/2023	09-.01(4) and 07-.01(5)
$PM_{2.5}$	0.90	0.90	0.90	0.41	0.41	0.41	-	6/21/2023	09-.01(4) and 07-.01(5)

1. PM emissions are controlled by dust collectors.
2. The net change in PM emissions is based on the Title V permit allowable of 8.1 pounds per hour (35.47 tons per year).
3. Allowable emissions requested by the permittee in the agreement letter dated x.

Source 89-0077-04
Manufacturing and Material Usage

Permit Number: 981102

Source Status: New☐ Modification☐ Expansion☒ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☒ NSPS☐ NESHAPs☐ **Previous Permit Number:** Construction ______ Operating 569874

Pollutant	Pounds/Hour			Tons/Year				Date of Data	Applicable Standard TAPCR 1200-03-
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change		
VOC				261.17	261.17	261.17	112.51	6/21/2023	09-.01(4)(j)(3) and 07-.07(2)
Single HAP					<9.9		-	6/21/2023	07-.07(2)
Total HAP					<24.9		-	6/21/2023	07-.07(2)

1. The VOC BACT limit for this source is 116.08 tons per 12 consecutive months and only applies to the new equipment to be installed at this source.
2. The net change in VOC emissions is the project emissions increase for this source. The current Title V permit includes a facility-wide VOC emission limit, and no source-specific VOC limit.

Source 89-0077-05
Rubber Mixing and Remilling

Permit Number: 981102

Source Status: New☐ Modification☐ Expansion☒ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☒ NSPS☐ NESHAPs☐ **Previous Permit Number:** Construction ______ Operating 569874

Pollutant	Pounds/Hour			Tons/Year				Date of Data	Applicable Standard TAPCR 1200-03-
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change		
PM/PM_{10}	38.00	38.00	38.00	11.32	11.32	11.32	-100.37	6/21/2023	09-.01(4) and 07-.01(5)
$PM_{2.5}$	8.74	8.74	8.74	2.60	2.60	2.60	-	6/21/2023	09-.01(4)
VOC				180.62	180.62	180.62	163.72	6/21/2023	09-.01(4)(j)3
Single HAP					<9.9		-	6/21/2023	07-.07(2)
Total HAP					<24.9		-	6/21/2023	07-.07(2)

1. The VOC BACT limit for this source is 80.27 tons per 12 consecutive months and only applies to the new mixers to be installed at this source.
2. The net change in PM emissions is based on the Title V permit allowable of 25.5 pounds per hour (111.69 tons per year).
3. The net change in VOC emissions is the project emissions increase for this source. The current Title V permit includes a facility-wide VOC emission limit, and no source-specific VOC limit.

Source 89-0077-10
Powerhouse

Permit Number: 981102

Source Status: New☐ Modification☐ Expansion☒ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☒ NSPS☒ NESHAPs☐ **Previous Permit Number:** Construction ______ Operating 569874

Pollutant	Pounds/Hour			Tons/Year				Date of Data	Applicable Standard 1200-03-
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change		
PM	5.55	5.55	5.55	15.96	15.96	16.0	2.50	6/21/2023	06-.07(7)
$PM_{10}/PM_{2.5}$	1.77	1.77	5.55	15.96	15.96	16.0	-	6/21/2023	06-.01(7)
SO_2	35.80	35.80	35.80	78.5	78.5	78.5	-99.4	6/21/2023	14-.01(3)
CO	25.55	25.55	25.55	84.87	84.87	84.9	27.05	6/21/2023	06-.03(2)
NO_X	40.04	40.04	40.04	85.34	85.34	85.34	-33.56	6/21/2023	06-.03(2)
VOC	1.67	1.67	1.67	5.56	5.56	5.56	1.77	6/21/2023	09-.01(4)(j)3 and 06-.03(2)
Single HAP					<9.9		-	6/21/2023	07-.07(2)
Total HAP					<24.9		-	6/21/2023	07-.07(2)

1. The VOC BACT limit for this source is 1.77 tons per 12 consecutive months and only applies to the new boiler to be installed at this source.
2. The net change in PM, SO_2, and NO_X emissions are based on the limits specified in the current Title V permit.

3. The net change in VOC and CO emissions are the project emissions increases for this source. The current Title V permit includes a facility-wide VOC emission limit, and no source-specific VOC limit. The current permit does not include a CO limit.

Source 89-0077-22
Tire Curing

Permit Number: 981102

Source Status: New☐ Modification☐ Expansion☒ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☒ NSPS☐ NESHAPs☐ **Previous Permit Number:** Construction ______ Operating 569874

Pollutant	Pounds/Hour			Tons/Year				Date of Data	Applicable Standard 1200-03-
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change		
VOC				104.77	104.77	104.77	66.43	6/21/2023	09-.01(4)(j)(3) and 07-.07(2)
Single HAP					<9.9		-	6/21/2023	07-.07(2)
Total HAP					<24.9		-	6/21/2023	07-.07(2)

1. The VOC BACT limit for this source is 34.92 tons per 12 consecutive months and only applies to the new curing lines to be installed at this source.
2. The net change in VOC emissions is the project emissions increase for this source. The current Title V permit includes a facility-wide VOC emission limit, and no source-specific VOC limit.

APPENDIX D

Public Notice

APPENDIX E

PSD Determination Calculations

APPENDIX F

Dispersion Modeling Correspondence

Message String 1

From: Howard, Chris <Howard.Chris@epa.gov>
Sent: Monday, March 13, 2023, 9:25 AM
To: Richard Smrz <Richard.Smrz@tn.gov>
Cc: Haidar Alrawi <Haidar.Alrawi@tn.gov>; Lusky, Katy <Lusky.Kathleen@epa.gov>; Gillam, Rick <gillam.rick@epa.gov>; Shepherd, Lorinda (she/her/hers) <Shepherd.Lorinda@epa.gov>
Subject: [EXTERNAL] EPA Region 4 of Ozone Analysis for 89-0077 Bridgestone Americas Tire Ops in Morrison

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****
Richard,

Thank you for providing us with the opportunity to review the air quality analysis for Bridgestone Americas. We have reviewed the ozone analysis performed by the applicant and we have no comments. It should be noted that these comments do not include any comments that the EPA Region 4 ARD Permits Section may have regarding permitting or BACT issues.

Thanks!

-Chris

Christopher M. Howard
Regional Meteorologist
US EPA Region 4 - Atlanta
404/562-9036
Howard.chris@epa.gov

From: Richard Smrz <Richard.Smrz@tn.gov>
Sent: Friday, March 3, 2023 1:21 PM
To: Howard, Chris <Howard.Chris@epa.gov>; Monteith, Richard <Monteith.Richard@epa.gov>; aq_nepa@fws.gov
Cc: 'Tim_Allen@fws.gov' <Tim_Allen@fws.gov>; 'Catherine_Collins@fws.gov' <Catherine_Collins@fws.gov>; Ming, Jaron E <jaron_ming@fws.gov>; ghazal.majidi-weese@usda.gov; melanie.pitrolo@usda.gov; john_vimont@nps.gov; kirsten_king@nps.gov; Haidar Alrawi <Haidar.Alrawi@tn.gov>
Subject: FW: PSD application for 89-0077 Bridgestone Americas Tire Ops in Morrison
Attached: FINAL 02.01.2023 BATO PSD Permit App - (public)_redacted.pdf

USEPA Region 4 staff and Federal Land Managers,

Please see the attached PSD application we received from Bridgestone Americas Tire Ops in Morrison, Tennessee.
Please send any comments you might have back to Haidar and me.
Thank you all in advance for reviewing it.

Richard A. Smrz | Environmental Consultant

TN Department of Environment & Conservation

Air Pollution Control Division,
Regulatory Development and Complex Sources Section
Permit Modeling Program
Knoxville Environmental Field Office
3711 Middlebrook Pike, Knoxville, TN 37921-6538
Office: 865-594-5567, Receptionist: 865-594-6035

E-mail: Richard.Smrz@tn.gov

Message String 2

From: Ghazal Majidi-Weese - FS, Asheville - FS, NC <ghazal.majidi-weese@usda.gov>
Sent: Thursday, April 27, 2023 2:48 PM
To: Shepherd, Lorinda <Shepherd.Lorinda@epa.gov>
Cc: King, Kirsten L <kirsten_king@nps.gov>; Bae, Estelle <Bae.Estelle@epa.gov>; Haidar Alrawi <Haidar.Alrawi@tn.gov>
Subject: [EXTERNAL] PSD Permit Application FLM Notification - Bridgestone Americas Tire Operations, LLC - EPA Permit # PSD-TN-244

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****
Dear Lori:

Thank you for sending the information regarding the Bridgestone Americas Tire Operations, LLC proposed project in Morrison, Warren County, TN. Based on the emission rates and distances from the Class I areas listed below, the United States Department of Agriculture (USDA) anticipates that modeling would not show any significant additional impacts to Air Quality Related Values (AQRV) at the Class I areas administered by the USDA Forest Service. Therefore, we are not requesting that any Class I AQRV analyses be included in the PSD permit application. Our screening of this analysis does not indicate agreement with any AQRV analysis protocols or conclusions applicants may make independent of Federal Land Manager review. Please note that we are specifically addressing the need for an AQRV analysis for Class I areas managed by the USDA Forest Service.

Class I Area	**Distance to Facility (km)**	**Annual Emissions (tpy [1])**
Cohutta Wilderness	131	64.8
Joyce Kilmer Wilderness	175	64.8
Sipsey Wilderness	200	64.8

1. Sulfur dioxide, nitrogen oxides, total fine particulate matter (PM, PM_{10}, and $PM_{2.5}$), and sulfuric acid mist.
The state and/or EPA may have a different opinion regarding the need for a Class I increment analysis. Should the emissions or the nature of the project change significantly, please contact myself, Gisele Majidi-Weese (ghazal.majidi-weese@usda.gov, 828-337-2323) of the USDA Forest Service so that we might re-evaluate the project proposal.

Thank you for keeping us informed and involving the USDA Forest Service in the project review.

Regards,
Gisele

Gisele Majidi-Weese, PE (she/her)
Air Resource Specialist / Engineer

Forest Service
Southern Region

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ghazal.majidi-weese@usda.gov

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APPENDIX G

Draft Permit Correspondence

APPENDIX H

Response to EPA/Public Comments on Draft Permit

From:	Burnett, Terri
To:	APC Permitting
Cc:	Hunter Hill
Subject:	[EXTERNAL] Bridgestone Americas, LLC 89-0077__981102 BATO PSD revision documents - Redacted
Date:	Wednesday, August 16, 2023 9:19:41 AM
Attachments:	image003.png BATO 2023 PSD APP - REVISED BACT ANALYSIS(08.09.2023)-PUBLIC_redacted.pdf Appendix B BACT Cost Analysis Pages-PUBLIC_redacted.pdf

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Good morning,

I have attached the revisions requested by TDEC for the facilities PSD permit application.
One item of note has been redacted.

The confidential documentation is being sent via USPS.

Please let me, or Hunter Hill hunter@stevensehs.com, know if you require any further items.

Best regards,

Terri Burnett
Sr Environmental Engineer
Warren County Plant
725 Bridgestone Drive
Morrison, TN 37357
Bridgestone Americas, Inc.
Office: +1 (931) 668-5500 x1033
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BRIDGESTONE
Bridgestone Americas
Tire Operations
725 Bridgestone Drive
Morrison, TN 37357

August 11, 2023

Ms. Michelle Owenby, Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Re: Bridgestone Americas Tire Operations, LLC – Warren Plant
Emissions Source Reference Number 89-0077
BACT Analysis – Revised August 2023

Dear Ms. Owenby:

This letter transmits a revised BACT analysis for the Prevention of Significant Deterioration (PSD) permit application package submitted in June 2023.

BATO revised the original February 2023 application in response to TNAPC's request for additional information dated May 26, 2023. This revised BACT analysis is provided in response to TNAPC's second request dated July 26, 2023. With this submittal, BATO has revised the proposed BACT limits, such that the BACT limits only apply to the new equipment associated with the expansion project.

I have reviewed the enclosed submittal in its entirety. I hereby certify to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in the document are true, accurate and complete.

Please contact Spencer Hissam (Stevens EHS Consulting, 615-772-3865) or Ms. Terri Burnett (615-668-5500, X1033) if you have any questions or need additional information.

Sincerely,

Tim Painter
Plant Manager
Bridgestone Americas Tire Operations, LLC
Warren Plant

V. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

As part of PSD review, the applicant must demonstrate that the new or modified emission units meet Best Available Control Technology (BACT) for the pollutants for which a significant net emissions increase occurs.[4]

The only pollutant for which the Project results in a significant net emissions increase is VOC. A BACT analysis is required for VOC emissions from all manufacturing equipment with increased VOC emissions related to the project.

BACT is an emission limitation based on the maximum degree of reduction for each pollutant subject to the PSD requirements taking into account the energy, environmental, and economic impacts on the source. This analysis is conducted in accordance with the *"Top-Down"* guidance in the 1990 draft EPA *New Source Review Workshop Manual* (the Manual).

Reductions may be determined through the application of available control technologies, process design, and/or operational limitations. Such reductions may be necessary to demonstrate that the emissions remaining after application of BACT will not cause or contribute to significant deterioration of air quality, thereby protecting public health and the environment.

The "Top-Down" approach in the Manual is summarized as the following 5-step process:

Step 1: Identify all control technologies.
Step 2: Eliminate technically infeasible options.
Step 3: Rank remaining control technologies by control effectiveness.
Step 4: Evaluate the most effective controls and document results.
Step 5: Select BACT.

BACT does not apply to any existing emission units that will experience increased utilization or debottlenecking, but not a physical change or operational change. This is in accordance with 40 CFR 52.21(j)(3):

> *(3) A major modificaon shall apply best available control technology for each regulated NSR pollutant for which it would result in a significant net emissions increase at the source. This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operaon in the unit.*

Additionally, pursuant to TAPCR 1200-03-09-.01(4)(b)2.(i)(VI), "*an increase in the hours of operation or in the production rate, unless such a change would be prohibited under a legally enforceable permit condition which was established after January 6, 1975, or under regulations of this Division 1200-03,"* is not a physical change or a change in the method of operation.

Thus, BACT does not apply to the existing units as a result of this expansion, and this analysis focuses on BACT as it applies to the new equipment proposed for the expansion.

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[4] Tennessee Air Pollution Control Rule 1200-03-09-.01(4)(j)2.

BACT – Gas-Fired Boilers

VOC emissions from the new proposed boiler result from incomplete combustion caused when some of the fuel is only partially burned.

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for natural gas combustion sources:

No.	Control Alternative	Control Alternative Category
1	Catalytic oxidation	Add-on control
2	Clean fuel and good combustion	Proper operation

The most stringent control technology used to control CO emissions from combustion is catalytic oxidation, and these catalytic oxidation systems are also used to reduce VOC and organic HAP emissions. As the exhaust gas contacts the catalyst, the catalyst promotes the oxidation of CO and hydrocarbon compounds to form carbon dioxide (CO_2) and water (H_2O) as follows:

$$2\ CO + O_2 \rightarrow 2\ CO_2 + \text{heat}\ [320\ \text{Btu/ft}^3];\ \text{or}$$

$$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O + \text{heat}\ [907\ \text{Btu/ft}^3]\ \text{(if methane is present).}$$

BATO did not identify any lower emitting fuels or burner configuration technologies that would reduce VOC emissions from the proposed boiler.

Step 2: Eliminate technically infeasible options.

Catalytic oxidation of VOC in the exhaust of the boiler tubes would require a catalyst bed. Such systems are available, and can be installed as a modular unit in the boiler exhaust duct or stack. For a catalytic oxidation system to operate correctly, the exhaust gas must contain an amount of excess O_2 (typically 15%) and must be within a particular temperature range (typically between 500°F – 1250°F) depending on the type of catalyst material used. Exhaust gas temperatures that are too high may cause permanent damage to the catalyst, while operating temperatures that are too low result in a lower CO conversion efficiency. In the case of the natural gas boiler chosen, the exhaust temperature is less than the low end of the temperature window, and would require re-heating of the flue gas. This would increase natural gas use and associated criteria pollutant emissions and be cost-prohibitive. The oxidation catalyst would also convert CO emissions to CO_2. Installing a boiler VOC emissions control technology that will result in an increase in CO_2 emissions runs counter to the CO_2 emissions reduction goals of the current EPA administration. AP-42 Section 1.4 does not list catalytic oxidation as a control technology for natural gas boilers. The Boiler MACT does not require VOC emissions controls on gas-fired boilers. The potential VOC emissions from the new 75.0 MMBtu/hr boiler are less than 2 tpy.

A search of EPA's RBLC was performed that included recent VOC BACT determinations for small industrial gas-fired boilers. BACT is generally good combustion practices for small gas-fired boilers. Although a few entries noted flue gas recirculation was used, this is a NO_x control technology, not a VOC control technology. One result of the RBLC search was a 100 MMBtu/hr natural gas-fired auxiliary boiler at the Nemadji Trail Energy Center in Wisconsin. This unit was installed as part of a utility power generation plant, and the facility triggered PSD review for NO_x, CO, PM, VOC, and CO_{2e}. After reviewing the BACT analysis in the preliminary determination for this source, the BACT selected for this boiler was an oxidation catalyst; however, it was primarily selected for control of CO emissions in the PSD review, and it would not have been economically feasible for the control of VOC alone. According to the preliminary determination for this source, on pg 41, "an oxidation catalyst system for this size unit would require a total capital investment of $147,225. The annual cost of operating this oxidation catalyst system would be $80,801." When considering the cost for an oxidation catalyst system for a 75 MMBtu/hr boiler at BATO compared to this 100 MMBtu/hr boiler, it is conservative to estimate the annual cost of operating a similar system will be at least half as much or $40,400. Assuming a control efficiency of 50% for this system, on an annual basis, just 0.89 tons per year of VOC would be removed at a cost of $45,393 per ton of pollutants removed. Additional removal of CO emissions as a result of installing such a system on the proposed boiler is not required to be considered when determining BACT for VOC emissions. Thus, add-on VOC controls were determined to be not economically feasible.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

The only remaining control technology is good combustion practices & controls; and there are no environmental, energy, or economic impacts that would weigh against its use. Proper burner design and boiler tuning will minimize the VOC generated in the products of combustion. No add-on controls were considered feasible or were found in research of similar sources at other tire manufacturing plants. Furthermore, no auxiliary equipment is needed for this control option on commercial and industrial boilers with proper maintenance of the burner/boiler package and burning only clean gas as fuel. Therefore, annual tune ups are considered good combustion practices.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the proposed boiler to be clean fuels and good combustion practices. The BACT limit for VOC emissions from this boiler is 1.77 tons per year.

BACT – Mixing, Extruding, Calendaring, Cementing, and Curing

VOC emissions result from oils added to the rubber compounds in the mixers, solvent usage in the cement stations; and the vulcanization process in the curing presses.

MIXING Source 05

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for mixing:

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Alternative Materials (silane replacement)	Source reduction
8	Best Work Practices	No Control (PP)

A search of EPA's RACT/BACT/LAER Clearinghouse (RBLC) was conducted in December 2022 to identify the emission control technologies that were imposed by permitting authorities as BACT within the past ten years for emission sources comparable to the proposed expansion at the BATO facility. The RBLC search results returned several BACT Analysis performed at tire manufacturing facilities focused on the rubber mixing process primarily. The RBLC search results were compared to permits issued to other tire manufacturers to capture any additional permitted controls that may be required, but not included in the RBLC search results. A summary of the RBLC database search results is provided in the table below.

RBLC Search Results

Process Type: 99.015 Rubber Tire Manufacturing and Retreading

Regulated Pollutant VOC

Facility Name	State	Permit Date	Last Updated	Process Name	BACT Control Method
Cooper Tire & Rubber Company	AR	09/10/2019	11/10/2020	Upgrade Mixer #8	RTO
Bridgestone Aiken County PSR Plant	SC	05/15/2017	05/15/2017	Mixers, Milling, Extrusion equipment,	Work Practice Requirements

Facility Name	State	Permit Date	Last Updated	Process Name	BACT Control Method
				Curing, Final Inspection, Boiler(B2)	
Goodyear Tire & Rubber Company	KS	02/13/2017	08/10/2017	Mixer	RTO
Goodyear Tire & Rubber Company	VA	12/03/2014	05/05/2016	Rubber Mixing	RTO
Michelin US8 Facility	SC	12/13/2012	05/05/2016	Rubber Mixing	Work Practice Requirements for solvent usage and handling
Goodyear Tire and Rubber Co Lawton Tire Plant	OK	10/10/2012	11/07/2016	Banbury Mixing	RTO

Step 2: Eliminate infeasible options.

The most common add-on VOC control measure applicable to these emission units is the use of a regenerative thermal oxidizer (RTO) to destroy VOC in the exhaust of the emission source. These units employ a design that efficiently retains heat generated in the combustion chamber. The RTO is the most commonly utilized add-on control technology for the following reasons:

(1) The control efficiency provided by an RTO is comparable to other types of add-on control units;

(2) Due to the efficiency of the unit, the RTO has a limited impact to the environment. They require less supplemental fuel and electricity. They do not produce other wastes, such as scrubber water or hazardous waste;

(3) They function effectively in almost any normal production scenario; and

(4) They are often the most cost-effective control measure.

There may be specific challenges with utilizing most add-on control technologies. Capture efficiency for VOC emissions from Rubber Mixers is estimated at 85% and in summary is due to the fact that the lower “Batch Out” door of the mixer has a configuration that must be open for production, and cannot be effectively hooded. A large amount of air is required to collect the small portion of VOC generated and released from the “Batch Out” door. This large air flow would result in a dilute air stream with a small amount of VOC, and is usually exhausted to atmosphere without control. (See Appendix C for more detailed information on Rubber Mixer Capture Efficiency). Controls other than an RTO may be available such as recuperative thermal oxidizers, regenerative catalytic thermal oxidizers, flares, wet scrubbers, and biofiltration; however, these controls have not been used and proven effective in the tire industry. One example is that recuperative thermal oxidation has not been used in the tire industry because of the low concentration emission stream loading and highly variable flow. These specific challenges are described below, but the RTO is assumed to be the most effective and economical of the add-on controls. A condenser unit has not been demonstrated as effective at any tire plants for control of mixer emissions, and would not likely provide sufficient control of the low concentration, high flow exhaust stream from the mixer process. In addition, the VOCs condensed out of the exhaust flow would require disposal or further control with destruction. Therefore, BATO has not considered refrigerated VOC condensers further for this BACT analysis.

Existing boilers at the facility could control a small volume of Mixer exhaust flow, but not more than 7,000 scfm of Mixer exhaust flow per boiler (based on boiler rating of 75 MMBtu/hr requiring 14,100 scfm of combustion air at 15% excess air and 11.5 scf of air per scf of natural gas burned). With the current design basis of the Mixer exhaust (31,659 dscfm) going to either a Clay, Carbon Black, or Pigment dust collector for particulate matter emission control and material collection, control of only 7,000 cfm of exhaust air on two mixers would be ineffective.

Based on our review of the RBLC and knowledge of the industry, absorbers/wet scrubbers have not been determined effective and have not been installed for control of VOC emissions from mixing at tire plants. Although ethanol is a large component of the mixing VOC emissions and is water soluble, this technology is not feasible for the BATO Warren plant because the exhaust flow from mixing is extremely high. Absorbers are best suited to high concentration, low-flow applications for VOC control. Additionally, the plant does not have a way to treat the wastewater effluent that would result from the use of this technology since there is no wastewater treatment system onsite. Therefore, wet scrubber/absorption technology was not considered further.

Adsorption with activated carbon is another VOC emissions control technology in which VOCs are attracted to and bind to the surface of activated carbon and remain in the carbon until it is desorbed or reclaimed. A well designed adsorber system is capable of achieving 95% to 98% control efficiency at input concentrations between 500 and 2,000 ppm in air (US EPA, May 1999. CATC Technical Bulletin). An adsorber becomes nearly useless when inlet concentration gets so low that the VOC will not be effectively adsorbed. Explosions or fires in the carbon bed may occur if the concentration of the organics in the waste gas is not maintained substantially below the LEL of the specific compound being controlled. Carbon adsorbers have not been successful for controlling VOC emissions from tire manufacturing operations because solid adsorption media are susceptible to plugging by the PM given off by the process. While BATO’s mixers are vented first to dust collectors for PM control, the tire processing oils would not be able to be removed from carbon. Furthermore, carbon adsorption would produce two waste streams as the carbon beds become saturated and replaced and the recovered solvent containing VOCs is not able to be reused. Therefore, carbon adsorption is determined to be not technically feasible.

A few Goodyear tire plants have installed RTO's for VOC emissions from mixing. It is our understanding (based on a review of permitting documents) that the RTOs were installed in part to respond to a compliance order and in part to allow them maximum flexibility to increase silane usage and emissions. However, it does appear from review of the available information that the Goodyear facilities have limited their operational flexibility by specifying what materials are to be mixed in each mixer at each plant and only applying RTO control to certain mixers that have the highest emission rates (e.g., RTOs are only feasible on certain mixers if production is constrained in a certain way).

Because other tire plants have installed RTOs for mixing, BATO considered RTOs on each of the 4 new mixers with a proportional amount of silane usage for each mixer. A second scenario considered was installing 2 larger RTO's on 2 pairs of new mixers each using a proportional amount of silane per year. It's possible that particulate in the exhaust of the mixers would blind a concentrator wheel; however, BATO has considered the option to install a combined system in series that would accept all exhausts from the 4 new mixers in the concentrator wheel(s) and exhaust to a single RTO. Another configuration that was considered was a system exhausting 4 new mixers and 2 existing mixers to three concentrator wheels in series with a single RTO. Each of these configurations shows a BACT control cost >$12,000/ton VOC Emissions avoided as shown in Appendix B. In addition, BATO considered the option to install an RTO on 2 of the new mixers and assumed that these 2 mixers would be selected to process all Silane for the facility. The BATO Warren permit does not currently limit how each of its mixers is used. Tread can be mixed in any mixer. Flexibility in operations is needed in the plant to allow capability to be able to mix any type of rubber compound in any mixer and to be able to use the tire "recipe" components necessary to produce the types of tires their customers demand and to be able to reach the design capacity. The type and amount of silane used in BATO's tires has changed over time and BATO has experienced an increase in demand for tires that are manufactured using silane. Silane is added during the tread mixing process in order to impart certain characteristics to the rubber (tread) being mixed. Ethanol is emitted as the silane reacts with the rubber compound in the presence of high temperature and moisture. BATO has not evaluated redesigning the mixing process so that only certain mixers are used for mixing activities with higher VOC emissions potential using silane. We do not believe that redesigning or constraining the process in that way is required as part of a BACT analysis and would limit the overall production capability of the plant. Continued operational flexibility and lack of restriction on product flow within the plant is vital to maintaining BATO's current production rates and product quality. A review of the cost of each of these configurations mentioned above proved to be excessive as shown in Appendix B.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Based on this analysis, mixing emissions would be most effectively controlled by an RTO; however, this add-on control technology is not economically feasible based on the cost to install and operate the equipment. All other add-on control technologies listed are considered not technically feasible. Best work practices have been chosen as the best alternative to add-on control technologies for VOC emissions from Mixing.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the new mixing units is no control. Good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC materials where possible, cleaning up spills, and minimizing cleaning with VOC compounds should be implemented as BACT to control VOC emissions from all equipment associated with Source 05. BATO proposes an emission limit of 80.27 TPY as BACT for Source 05. This limit was chosen based on a total of 18.444 TPY of VOC emissions based on emissions factors for Banbury Mixing and a total of 162.17 TPY of VOC emissions from Silane injection at the mixers. Together these total 180.62 TPY, and since there are 4 new mixers out of a total of 9 mixers, 180.62 x (4 New/ 9 Total) = 80.27 TPY.

MANUFACTURING & MATERIAL USAGE Source 04

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emissions controls for milling, calendars, extruding, and cement stations.

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Alternative Materials (silane replacement)	Source reduction
8	Best Work Practices	No Control (PP)

The RBLC search described previously applies to these sources and to tire curing as well, and did not identify any additional control technologies as BACT.

Step 2: Eliminate infeasible options.

As with mixing emissions, the most effective add-on VOC control measure applicable to these emission units is the use of an RTO to destroy VOC in the exhaust of the emission source. This is due to the high control efficiency of RTO's, the overall efficiency of RTO's using less electricity and less fuel, the ability to control emissions without generating a waste such as scrubber water or hazardous wastes. RTO's function effectively in normal production scenarios, and they are often the most cost-effective control measure. A condenser unit has not been demonstrated as effective at any tire plants for control of manufacturing emissions, and would not likely provide sufficient control of the low concentration, high flow exhaust streams required to capture emissions from the milling, calendaring, extruding, and cement station processes. In addition, the VOCs condensed out of the exhaust flow would require disposal or further control with destruction. Therefore, BATO has not considered refrigerated VOC condensers further for this BACT analysis.

The milling, calendaring, and extruding processes that are currently fugitive, would require a large volume of exhaust air in order to be effectively captured and the existing boilers are only able to accept a small volume of exhaust air for control inside the combustion chamber as described in the section for Mixing emissions. Control of the low concentration and low volume relative to the overall volume of exhaust air that must be captured would be ineffective at controlling emissions from these sources.

For the new cement stations, with a current design basis that includes exhausting at an approximate flowrate of 11,000 cfm per cement station, BATO chose to evaluate two possible configurations for control with the existing boilers. The first configuration includes a single Zeolite concentrator wheel for all three new cement stations followed by one of the existing boilers for control. This configuration includes a conservative estimate of the required ductwork of 1,403 feet which is the minimum straight-line distance from the nearest new cement station to the boilers. We conservatively assumed 100% capture for this configuration, and cost of control was not economically feasible based on 95% control efficiency of the Concentrator & Boiler control system. The second configuration assumes that each of 3 new cement station can be exhausted separately to each of the two existing boilers and to the third proposed boiler. This configuration assumes that at least 1,403 feet of ductwork will be needed for each new cement station to be exhausted to the boiler area (total ductwork of 4,209 feet). For optimal boiler performance, we originally assumed this configuration would only be able to capture about 35% of the Cementer emissions based on the boilers being rated at 75 MMBtu/hr which equates to approximately 73,500 scf/hr of natural gas combusted. (Originally, we estimated total Capture/control efficiency = 35% Capture x 95% VOC Destruction = 33.3%). With a design of 15% excess air, it takes about 11.5 scf of air per scf of natural gas combusted. Therefore 14,100 scfm of combustion air per boiler is required at maximum heat input. The full exhaust flow rate volume from each Cementer of 11,000 cfm could not be completely vented to the boilers for control since boilers operate at different intervals than the Cementers and since clean combustion air is also necessary for proper boiler operation. For the sake of this analysis, we assumed a most conservative maximum capture efficiency for Cementer Exhaust to the Boilers of 85% and 95% VOC destruction efficiency (Overall control = 80.8%), and the cost of control for this configuration remains above $12,000 per ton of VOC emissions avoided. (See Appendix B).

Absorbers/wet scrubbers have not been determined effective and have not been installed for control of VOC emissions from manufacturing operations at tire plants. Although the VOC emissions are water soluble, this technology is not feasible for the BATO Warren plant because the exhaust flow required to capture emissions from milling, calendaring and extruding is extremely high. Absorbers are best suited to high concentration, low-flow applications for VOC control. Additionally, the plant does not have a way to treat the wastewater effluent that would result from the use of this technology since there is no wastewater treatment system onsite. Therefore, wet scrubber/absorption technology was not considered further.

As described previously, activated carbon adsorption becomes nearly useless when inlet concentration gets so low that the VOC will not be effectively adsorbed. No BACT determinations were found that include the use of carbon filtration to control emissions from rubber processing and manufacturing operations at tire manufacturing plants. Therefore, adsorption with activated carbon is considered not technically feasible.

An argument can be made that the highest VOC concentration from any of the rubber processing equipment including milling, extrusion, and calendaring is less than 20 ppm. At such a low concentration, none of the above listed add on control technologies are technically feasible. As described in EPA's Air Pollution Control Technology Fact Sheet for Thermal Incinerators, an inlet stream concentration of 1000 ppm VOC will be reduced to approximately 20 ppm when a 98% destruction efficiency is assumed. The extruders are not currently vented to any control devices due to negligible PM. However, it may be technically feasible to construct a hood to capture VOCs from all existing and new extruders in order to control the 52.0 tons/year of VOC emissions generated by the extruders. If we conservatively assumed that only 30,000 scfm of exhaust flow were needed to capture these emissions and vented to a single RTO, the estimated cost of avoided emissions would be greater than $8,000 per ton and therefore, economically infeasible. This analysis is included in Appendix B. BATO considered the feasibility of installing a smaller RTO to control VOCs from just the new extruders, but this cost would be on the same order of the above analysis of all the extruders and control even fewer total emissions per year. The next highest contribution of VOC emissions from rubber processing equipment is 20.56 tons/year from calendaring and could also feasibly be vented to an RTO for control of VOC emissions though it is not currently. We assume this process would also require at least 30,000 scfm of exhaust flow to capture these emissions for venting to the RTO. Therefore, the same control cost would be applied with even less tons of avoided emissions and control is not economically feasible.

The above argument can certainly be applied to the remaining equipment in source 04 Manufacturing and Material Usage with no processes from these operations with a VOC concentration that is likely higher than 10-20 ppm. At such a low concentration, none of the above listed add on control technologies are technically feasible. The achievable emission reduction is approximately 20 ppm resulting from 98% reduction of an inlet stream of 1000 ppm per the EPA's Air Pollution Control Technology Fact Sheet.

For the 5 existing cement stations and 3 additional new cement stations, BATO evaluated RTOs for each station, a single RTO to control all 8 cement stations, a single RTO to control the 3 new cement stations, and a VOC concentrator in conjunction with an RTO to control the 3 new cement stations. Cost analyses for each configuration are included in Appendix B and show that the cost of avoided emissions are greater than $8,000 per ton of avoided emissions and are therefore, economically infeasible.

BATO has not identified acceptable alternative materials that may be used in the rubber compounds or as cement that can provide the same quality necessary for our products. Poor tire quality can result in unsafe tire construction.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Based on this analysis, there are no technically feasible and economically feasible add-on control technologies for VOC available for the Source 04 operations. Best work practices is the only remaining control option.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the milling, calendars, extruding, and cement stations is no control. Good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC tire sprays and mold release products, cleaning up spills, and minimizing cleaning with VOC compounds should be implemented as BACT to control VOC emissions from all equipment associated with Source 04. BATO proposes an emission limit of 116.08 TPY as BACT for Source 04. The total future potential VOC emissions for existing and new equipment for Source 04 is 261.17 TPY, and the contribution of VOC emissions from new equipment is equivalent to the ratio of the additional 4 new mixers to the total of 9 mixers. 261.17 TPY x (4 New/ 9 Total) = 116.08 TPY.

TIRE CURING Source 22

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for tire curing.

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Best Work Practices	No Control (PP)

Step 2: Eliminate infeasible options.

The highest VOC concentration from the tire curing operations is likely less than 20.0 ppm. This is lower than the 20 ppmv threshold at which add-on controls are feasible. At such a low concentration, none of the above listed add on control technologies are technically feasible. As referenced above in the BACT analysis for Source 04 Manufacturing & Material Usage, the achievable emission reduction is approximately 20 ppm resulting from 98% reduction of an inlet stream of 1000 ppm. The most feasible option for add-on controls is a zeolite concentrator system of three concentrator wheels with a single RTO. BATO evaluated the cost to install two of these systems for control of VOC emissions captured over the 2 new curing bays. The cost was determined to be not economically feasible, and the analysis is provided in Appendix B.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Best work practices with no add-on controls is the only remaining control alternative, and we propose BACT for VOC emissions from tire curing to be best work practices.

Step 5: Select BACT.

As described above, BATO reviewed the RBLC, recent permits, and relevant industry standards. Based on the low concentration of VOC, BACT for VOC from tire curing operations is proposed to be good work practices with no add-on controls. These practices will include storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC compounds. BATO proposes an emission limit of 34.92 TPY as BACT for new equipment installed for Tire Curing (Source 22). Total Tire Curing VOC emissions are estimated at 104.77 TPY future potential, and the 2 new curing bays will account for one third of the total curing emissions from 6 curing bays.

Table 2: **Summary of Control Cost Analyses**

Emission Unit	Control Configuration	VOC Emissions Avoided (tpy)	Annualized Control Cost ($)	Cost Effectiveness ($/ton)
89-0077-04: Cement Stations	8 Stations: RTO for each Station	172.1	$3,738,220	$21,723
	8 Stations: One RTO No Concentrator	172.1	$3,203,927	$18,619
	3 New Stations: One RTO No Concentrator	64.5	$764,619	$11,849
	3 New Stations: Concentrator + One RTO	62.6	$799,211	$12,776
	3 New Stations: Concentrator + Boiler	62.6	$957,963	$15,314
	3 New Stations: Controlled in 3 Boilers	53.2	$791,357	$14,883
89-0077-04: Extruders	Extruders – Individual RTO	51.0	$685,174	$13,446
89-0077-05: Mixers 621, 622, 623, 624, 625, 626, 627, 328, and 329	Proportional Silane Use - RTOs on all 4 new Mixers	16.7 (per mixer)	$685,174 (per mixer)	$40,987
	Proportional Silane Use - RTOs on pairs of Mixers (626&627; 328&329)	33.4 (per mixer pair)	$2,433,734 (per mixer pair)	$72,792
	Total Silane Used in 2 mixers – single RTO	138.5	$2,433,734	$17,572
	Concentrator & RTO system on 4 new mixers	64.8	$833,667	$12,861
	Concentrator & RTO system on 4 new mixers & 2 existing mixers	97.2	$1,188,241	$12,221
	2 New Mixers: Controlled in existing boilers	8.43	$341,740	$40,535
89-0077-22: Tire Curing	2 Concentrator & RTO systems for the new curing bay	33.2	$2,696,434	$81,277

BACT Insignificant Activities

If we assume that BACT has a threshold of economic feasibility of $8,000/ton of avoided emissions and is technically achievable for any of the listed insignificant activities. And if we assume that the control technology selected is able to achieve at least 98% control efficiency of VOC emissions. Then, the highest annual cost of control would be $2,352 for the Portable Diesel Air compressors and it would only remove 0.29 tons/year of VOC's. BATO is not aware of any VOC control technologies that are able to be operated for less than $2,500/year and applicable to the listed insignificant activities at the facility. BATO will continue to implement good and best industry practices to minimize VOC emissions from all insignificant activities at this facility. These practices are briefly described below for each of the insignificant activities with VOC emissions that will likely see some increased utilization.

Solvent Storage Tank: The solvent storage tank is an existing unit, and BACT is not required for existing units.

Tire Spraying (Dopers): Calculations for VOC Emissions from this activity are included in the Material Processing calculation and VOC Summary table. This Material is Inside Tire Spray Chem-Trend ML-3114 and has a low VOC Weight Fraction of 0.002 (*0.2%*). The SDS for this material is attached following the description of Insignificant Activities in the application. Use of Low-VOC materials is considered BACT for this activity. BATO proposes a BACT limit of 0.84 TPY for new Tire Spraying VOC emissions resulting from the expansion.

Cement Spraying: VOC emissions from this activity are accounted for in the Cement Stations above for our Source 04 BACT Analysis. PM emissions are less than 1 ton/year and are described in the Insignificant Activities section in the application. Use of Low-VOC materials and best work practices are proposed as BACT for VOC emissions from Cement Spraying. BATO proposes a BACT limit of 0.37 TPY for new Cement Spraying VOC emissions resulting from the expansion.

Tire Repair: For tire repairs, an average of 2% of tires require repairs, an average of 45 grams (less than 0.1 lbs) of rubber is removed, and 45 grams of rubber has to be cured onto the repair. The emission factor for rubber curing is 2.24 E-04 lb VOC per lb of rubber. The emission factor for rubber grinding is 1.59 E-02 lb VOC per lb of rubber removed. Assuming [redacted] – the VOC emissions from this activity are 0.080 Ton/year. BATO uses best industry practices to maintain Tire Repair emissions this low. These practices are considered BACT for this activity. BATO proposes a BACT limit of 0.08 TPY for Tire Repair.

Final Inspection Marking: Typically, final inspection marking is completed with a dot matrix marking system utilizing the orange and yellow ink products shown in the Material Processing – Solvent Usage Table and VOC Summary in the permit application. These VOC emissions are accounted for in the Source 04 BACT analysis above, and the minimum amount of ink is used to mark the tires for final inspection. In the description of Insignificant Activities in the application, we accounted for an additional volume of Spray Paint cans for Final Inspection marking. This activity is not typical, and only occurs if the Dot Matrix machine was not functional. BATO will implement best work practices and using the minimum amount of ink to mark tires for final inspection will be considered BACT for this activity. BATO proposes a BACT limit of 2.23 TPY for new Final Inspection Marking VOC emissions resulting from the expansion.

Oil Storage Tanks: BATO will add a new RM010 Tank, a new RS012 Tank, and a new WS019 Tank – all are specified to be the identical size and contents to the existing oil storage tanks. With these additional storage tanks, VOC emissions are estimated to increase from 0.030 TPY to 0.044 TPY. Emissions from storage tanks are kept to a minimum with good work practices, submerged filling, and light-colored tanks to prevent breathing losses from solar warming. These practices are considered BACT for the oil storage tanks. The proposed BACT limit for new storage tanks is 0.02 TPY.

Tire Testing Room: No VOC emissions are claimed from the Tire Testing Room activities, so this source is not included in the BACT analysis.

Two Electron Beam Generators (Precure machine): VOC emissions are included in the emission factors for Curing, and therefore, this activity is already accounted for above in our BACT Analysis for Source 22. Additionally, there will not be any new Precure machines associated with the expansion.

Mold Cleaning: No VOC emissions are claimed or expected from this activity and only particulate matter emissions are included in the description of Insignificant Activities in the application.

Tread Grinders: The BATO Warren Plant does not use Tread Grinders at this facility. This activity is no longer included in the description of Insignificant Activities in the permit application.

Inside Day Bins: Day Bins have bin vent filters for Particulate Matter emissions from carbon black and pigment transfers. No VOC emissions are claimed from this activity, so this source is not included in the BACT Analysis.

The remaining activities listed below, which are Categorical Insignificant Activities, are not expected to experience any increased utilization as part of this expansion. The emergency diesel engines, emergency diesel fire pumps, and gasoline storage tank are existing units. BATO uses best industry practices with submerged filling on fuel storage tanks; proper operation and maintenance on diesel air compressors, natural gas generator, and space heaters; best practices are in place to maintain and operate the water cooling towers. The best industry practices are in place for solvent management from the Parts Washers. No VOC emissions are expected from the PPE Vacuum Stations.

1.	Two 30,000 gallon #2 Fuel Oil Storage Tanks	TAPCR 1200-3-9-.04(5)(f)17
2.	300 gallon Diesel Tanks (2)	TAPCR 1200-3-9-.04(5)(f)17
3.	300 gallon Kerosene Tank	TAPCR 1200-3-9-.04(5)(f)17
4.	300 gallon Gasoline Tank	TAPCR 1200-3-9-.04(5)(f)17
5.	Portable Diesel Air Compressors	TAPCR 1200-3-9-.04(5)(f)37

6. Standby Diesel Emergency Generator TAPCR 1200-3-9-.04(5)(f)37

7. Standby Natural Gas Generator TAPCR 1200-3-9-.04(5)(f)37

8. Diesel Powered Emergency Water Pumps TAPCR 1200-3-9-.04(5)(f)37

9. Two 550 gallon Diesel Tanks TAPCR 1200-3-9-.04(5)(f)17

10. Space Heaters TAPCR 1200-3-9-.04(5)(f)14

11. Water Cooling Towers TAPCR 1200-3-9-.04(5)(f)15

12. Parts Washer TAPCR 1200-3-9-.04(5)(f)76

13. Personal Protective Equipment Vacuum Stations TAPCR 1200-3-9-.04(5)(f)94

Table 3: SUMMARY OF BACT ANALYSIS FOR VOC'S

Emission Source	VOC Emission Limit	Control Technology
Source 04 Manufacturing & Material Usage	116.08 tons/yr	Best work practices
Source 05 Material Handling and Mixer Charging	80.27 tons/yr	Best work practices
Source 10 Three Boilers & One Hydronic Heater	1.77 tons/yr	Use of clean fuels, good combustion practices, and efficient boiler design
Source 22 Tire Curing	34.92 tons/yr	Best work practices
Insignificant Activities (Highest VOC = Portable Diesel Air Compressors)		Best industry practices as described in Insignificant Activities section above
Tire Spraying (Dopers)	0.84 tons/year	Low-VOC materials
Cement Spraying	0.37 tons/year	Low-VOC materials and best work practices
Tire Repair	0.08 tons/year	Best work practices
Final Inspection Marking	2.23 tons/year	Best work practices and use minimum amount of ink
Oil Storage Tanks	0.02 tons/year	Best industry practices, submerged filling, and light-colored tanks

Warren County Expansion - BACT Info
Mixer - VOC Control of Baghouse Exhaust

	RTO Size - CFM	30,000 CFM	64,000 CFM
Annual cost of RTO [redacted]		$685,174	$2,433,734

Total No. of Mixers
9

[redacted]

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse [redacted] = 30,000 scfm — Vent one mixer to a single RTO

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)orig		$612,100	Durr Estimate in 8.9.2019 Email
Equipment Cost (EC)updated		$875,000	Durr Estimate updated in 01.09.2023 Email
Freight	0.05*EC	$43,750	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$26,250	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$87,500	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$82,600	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Control Equipment Installed on new mixers
Total Direct Installation Costs (DC) =		$309,750	
Indirect Installation Costs			
Engineering	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075	
Total Installed Cost (PEC + DC + IC) =		$1,662,325	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,691,964**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	39 kW for fan	$14,560	Elec. Cost= $0.0425 0.0425 $/kWh Warren Co T. Burnett email 12.28.2022; Operation= 8,760 hr/yr
Fuel Cost		$182,313	Fuel use 33,974 MMBtu/yr; gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift; $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift; $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C; C = operating labor + maintenance costs
Administration		$23,850	2% TCC
Property Taxes		$11,925	1% TCC
Insurance		$11,925	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$240,897.56	
Total Annual Cost		**$685,174**	

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 30,000 scfm based on controlling a single Mixer in August 2019.
They additionally provided a second budgetary cost estimate for an individual RTO rated for 30,000 scfm to control a single Mixer in January 2023.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse [redacted] x 2 =		64,000 scfm		Vent two mixers to a single RTO
Direct Costs		**Cost**		**Cost Factor/Comments**
Purchased Equipment Costs				
Equipment Cost (EC)orig		$2,240,000	2002 Dollars	Reference 1 - Minimum of the EPA Clean Air Technology Center Fact Sheet for Regenerative Oxidizers. (fact sheet presents a capital cost range of $35-140/scfm; we conservatively applied the minimum to estimate the capital cost of a standalone RTO.
Equipment Cost (EC)scaled		$4,714,792	2022 Dollars	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index CE Index in 2022 = 821.3 CE Index in 2002 = 390.2
Freight	$0.05*EC_b$	$235,740		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$141,444		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$471,479		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$5,563,455		
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$445,076.40		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$778,884		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$222,538.20		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$111,269		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor = 0%		$0		Control Equipment Installed on new mixers factor of up to 50% is appropriate - so this is conservative to assume $0
	Total Direct Installation Costs (DC) =	$1,669,037		
Indirect Installation Costs				
Engineering	0.10*PEC	$556,346		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$278,173		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$556,346		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$111,269		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$166,904		Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$1,724,671		
	Total Installed Cost (PEC + DC + IC) =	$8,957,163		
Ductwork	1000 feet	$987,956		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$9,945,118**		

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	83 kW for fan	$31,061	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$389,203	Fuel use	72,477	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$198,902	2% TCC		
Property Taxes		$99,451	1% TCC		
Insurance		$99,451	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$1,415,961.09			
Total Annual Cost		**$2,433,734**			

Basis: **1) EPA's RTO Fact Sheet for oxidizers, *www.epa.gov/catc/clean-air-technology-center-products#factsheets* , states capital cost range of an RTO is $35-140/scfm, minimum of range selected.**

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for All 4 new Mixers = 126,636 scfm

			Cost	Cost Factor/Comments
Direct Costs				
Purchased Equipment Costs				
	Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000
	Scaled RTO Equipment Cost (EC_b)		$1,367,669	Scaled (Larger RTO cost * (Smaller RTO flowrate/Larger RTO Flowrate)
	Freight	$0.05*EC_b$	$68,383	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
	Taxes	$0.03*EC_b$	$41,030	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
	Instrumentation	$0.10*EC_b$	$136,767	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =		$1,613,849	
Direct Installation Costs				
	Foundations and Supports	0.08*PEC	$129,107.93	Table 2.8 of the OAQPS Control Cost manual
	Handling and Erection	0.14*PEC	$225,939	Table 2.8 of the OAQPS Control Cost manual
	Electrical	0.04*PEC	$64,553.97	Table 2.8 of the OAQPS Control Cost manual
	Piping	0.02*PEC	$32,277	Table 2.8 of the OAQPS Control Cost manual
	Insulation for Ductwork	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
	Painting	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
	Site Preparation		Unknown	(unknown at this time)
	Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =		$484,155	
Indirect Installation Costs				
	Engineering	0.10*PEC	$161,385	Table 2.8 of the OAQPS Control Cost manual
	Construction and Field Expenses	0.05*PEC	$80,692	Table 2.8 of the OAQPS Control Cost manual
	Contractor Fees	0.10*PEC	$161,385	Table 2.8 of the OAQPS Control Cost manual
	Start-up	0.02*PEC	$32,277	Table 2.8 of the OAQPS Control Cost manual
	Performance test	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
	Contingencies	0.03*PEC	$48,415	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =		$500,293	
	Total Installed Cost (PEC + DC + IC) =		$2,598,297	
Ductwork		120 feet	$118,555	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)		TCC =	**$2,716,852**	

			Cost	Cost Factor/Comments		
Direct Annual costs						
	Electricity Cost	165 kW for fan	$61,459	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
				Operation=	8,760	hr/yr
	Fuel Cost		$77,011	Fuel use	14,341	MMBtu/yr
				gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
	Operating Labor					
	Operator	1 hr/shift	$36,474			
	$	33.31 /hr		T. Burnett email 12.28.2022		
	Supervisor		$5,471	15% of operating labor, Reference 3		
	Maintenance	1 hr/shift	$41,435			
	Labor $	37.84 /hr		T. Burnett email 12.28.2022		
	Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs				Reference 3 Table 2.10		
	Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
	Administration		$54,337	2% TCC		
	Property Taxes		$27,169	1% TCC		
	Insurance		$27,169	1% TCC		
	Interest Rate	7.00%				
	Years for Loan	10				
	Capital Recovery (Annualized Capital Cost)		$386,818.58			
Total Annual Cost			**$833,667**			
	Rubber VOC and EtOH from Silane at 4 new Mixers (tpy)		**80.27**	Control Device Capture Efficiency =	85%	Control Efficiency = 95%
	Controlled VOC Emissions from 4 new Mixers (tpy)		**15.45**			
	VOC Emissions Avoided (tpy)		**64.82**			
	BACT Cost ($/Ton of VOC Emissions Avoided)		**$12,861**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. For a smaller unit that will be used to control 4 mixers, a ratio of the exhaust flowrates with no scaling factor was used to scale the cost. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for All 4 new Mixers and 2 existing mixers = 189,954 scfm

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000 for a system with three concentrator wheels with one common RTO.
Freight	$0.05*EC_b$	$108,000	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$64,800	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$216,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$2,548,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$203,904.00	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$356,832	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$101,952.00	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$50,976	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
Total Direct Installation Costs (DC) =		$764,640	
Indirect Installation Costs			
Engineering	0.10*PEC	$254,880	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$127,440	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$254,880	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$50,976	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$76,464	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$790,128	
Total Installed Cost (PEC + DC + IC) =		$4,103,568	
Ductwork	180 feet	$177,832	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$4,281,400**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	248 kW for fan	$92,189	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$115,517	Fuel use	21,511	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$85,628	2% TCC		
Property Taxes		$42,814	1% TCC		
Insurance		$42,814	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$609,575.04			
Total Annual Cost		**$1,188,241**			
Rubber VOC and EtOH from Silane at 4 new Mixers + 2 existing Mixers (tpy)		**120.41**	Control Device Capture Efficiency =	85%	Control Efficiency = 95%
Controlled VOC Emissions from 4 new Mixers + 2 existing Mixers (tpy)		**23.18**			
VOC Emissions Avoided (tpy)		**97.23**			
BACT Cost ($/Ton of VOC Emissions Avoided)		**$12,221**			

Basis:

1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. It is assumed that a similarly sized unit would be able to control the exhaust volume from 6 Mixers (4 New Mixers and 2 Existing Mixers) totaling nearly 200,000 cfm. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR MIXING - BOILER CONTROL
BRIDGESTONE WARREN CO

Air flow rate for Mixer =		31,659 scfm	Vent a single Mixer to a boiler for control.
Total Air flow rate able to be vented for 2 Mixers =		14,000 scfm	Vent 2 separte streams from Mixers to existing boilers for control.
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$10,000	Min. Cost associated with the installation of a booster fan. (Reference 1)
Freight	0.05*EC	$500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$300	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$1,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$11,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$944	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$1,652	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$472	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$3,540	
Indirect Installation Costs			
Engineering	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$590	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$354	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$3,658	
	Total Installed Cost (PEC + DC + IC) =	$18,998	
Ductwork	1780 feet	$1,758,561	Chris Buchanan on 6.07.2023.(BATO Engineering Div. Manager) & Reference 2 Scaled
Total Capital Cost (TCC)	TCC =	**$1,777,559**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	41 kW for fan	$15,365	Elec. Cost= $0.0425; 0.0425 $/kWh Warren Co 2022 cost; T. Burnett email 12.28.2022; Operation= 8,760 hr/yr
Fuel Cost		$0	Fuel use 0 MMBtu/yr; gas cost $ 5.37 /MMBtu; 2022 Warren Co gas cost; T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/month	$400	
$	33.31 /hr		T. Burnett email 12.28.2022
Supervisor		$60	15% of operating labor, Reference 3
Maintenance	1 hr/month	$454	
Labor $	37.84 /hr		T. Burnett email 12.28.2022
Material		$454	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$820.70	0.6 * C; C = operating labor + maintenance costs
Administration		$35,551	2% TCC
Property Taxes		$17,776	1% TCC
Insurance		$17,776	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$253,084.40	
Total Annual Cost		**$341,740**	
Rubber VOC and EtOH from Silane at 2 new Mixers (tpy)		**40.14**	Control Device Capture Efficiency = 22%; Control Efficiency = 95%
Controlled VOC Emissions from 2 new Mixers (tpy)		**31.71**	
VOC Emissions Avoided (tpy)		**8.43**	
BACT Cost ($/Ton of VOC Emissions Avoided)		**$40,535**	

Basis:
1) Engineering Judgement used to estimate cost of booster fan.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR EXTRUDING
BRIDGESTONE WARREN CO

Air flow rate for Extruding (minimum) = 30,000 scfm — Vent Extruders to a single RTO

		Cost	Cost Factor/Comments
Direct Costs			
Purchased Equipment Costs			
Equipment Cost (EC)orig		$612,100	Durr Estimate in 8.9.2019 Email
Equipment Cost (EC)updated		$875,000	Durr Estimate updated in 01.09.2023 Email
Freight	0.05*EC	$43,750	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$26,250	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$87,500	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$82,600	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Control Equipment Installed on new mixers
Total Direct Installation Costs (DC) =		$309,750	
Indirect Installation Costs			
Engineering	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075	
Total Installed Cost (PEC + DC + IC) =		$1,662,325	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,691,964**	

		Cost	Cost Factor/Comments
Direct Annual costs			
Electricity Cost	39 kW for fan	$14,560	Elec. Cost= $0.0425 0.0425 $/kWh Warren Co T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$182,313	Fuel use 33,974 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift	$36,474	
$	33.31 /hr		T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance	1 hr/shift	$41,435	
Labor $	37.84 /hr		T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C C = operating labor + maintenance costs
Administration		$23,850	2% TCC
Property Taxes		$11,925	1% TCC
Insurance		$11,925	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$240,897.56	
Total Annual Cost		**$685,174**	
Total VOC Emissions avoided = Total Emissions * 98% Dest. Efficiency			**50.96 Tons VOC Avoided**
Economic Feasibility $/ton avoided.			**$13,446**

Basis: **1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 30,000 scfm based on controlling a single Mixer in August 2019.**
They additionally provided a second budgetary cost estimate for an individual RTO rated for 30,000 scfm to control a single Mixer in January 2023. We applied the same cost for control of extruders.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Summary - Cement Station Control Cost Analysis

[redacted]

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station =	11,000 scfm			Ven[redacted] cement station to an RTO for control.
Direct Costs		**Cost**		**Cost Factor/Comments**
Purchased Equipment Costs				
Equipment Cost (EC_a)		$360,000	2019 Dollars	Durr Estimate in 11.08.2019 Email - Reference 1
Equipment Cost (EC_b)		$490,980	2022 Dollars	Durr Estimate in 11.08.2019 Email - (Scaled to 2022) 602.2 is the 2019 (August) CE Plant Cost Index 821.3 is the 2022 (September) CE Plant Cost Index
Freight	$0.05*EC_b$	$24,549		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$14,729		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$49,098		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$579,356		
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$46,348.49		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$81,110		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$23,174.24		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$11,587		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor		$0		Install on new cement stations
	Total Direct Installation Costs (DC) =	$173,807		
Indirect Installation Costs				
Engineering	0.10*PEC	$57,936		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$28,968		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$57,936		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$11,587		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$17,381		Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$179,600		
	Total Installed Cost (PEC + DC + IC) =	$932,763		
Ductwork	140 feet	$138,314		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,071,077**		
Direct Annual costs		**Cost**		**Cost Factor/Comments**
Electricity Cost	14 kW for fan	$5,339		Elec. Cost= $0.0425 — 0.0425 $/kWh Warren Co 2022 cost, T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$66,894		Fuel use 12,457 MMBtu/yr gas cost $ 5.37 /MMBtu — 2022 Warren Co gas cost, T. Burnett email 12.28.2022
Operating Labor				
Operator	1 hr/shift $ 33.31 /hr	$36,474		T. Burnett email 12.28.2022
Supervisor		$5,471		15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift $ 37.84 /hr	$41,435		T. Burnett email 12.28.2022
Material		$41,435		100% of maintenance labor, Reference 3
Indirect Annual Costs				Reference 3 Table 2.10
Overhead		$74,889.13		0.6 * C — C = operating labor + maintenance costs
Administration		$21,422		2% TCC
Property Taxes		$10,711		1% TCC
Insurance		$10,711		1% TCC
Interest Rate	7.00%			
Years for Loan	10			
Capital Recovery (Annualized Capital Cost)		$152,497.28		
Total Annual Cost		**$467,278**		

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 11,000 scfm based on controlling a single cement station in November 2019.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 33,000 scfm — Vent [redacted] cement stations to a single RTO for control.

Direct Costs		**Cost**		**Cost Factor/Comments**
Purchased Equipment Costs				
Equipment Cost (EC)orig		$1,155,000	2002 Dollars	Reference 1 - Minimum of the EPA Clean Air Technology Center Fact Sheet for Regenerative Oxidizers. (fact sheet presents a capital cost range of $35-140/scfm; we conservatively applied the minimum to estimate the capital cost of a standalone RTO.
Equipment Cost (EC)scaled		$2,431,065	2022 Dollars	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index CE Index in 2022 = 821.3 CE Index in 2002 = 390.2
Most Conservative Updated Low estimate of Equipment Cost (EC_c)		$875,000	2023 Dollars	Durr Estimated cost of RTO for a single Mixer at approx. 30,000 cfm updated in 01.09.2023 Email
Freight	$0.05*EC_c$	$43,750		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_c$	$26,250		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_c$	$87,500		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500		=sum of most conservative EC + Freight + Taxes + Instrumentation
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$82,600.00		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300.00		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor = 0%		$0		Install on existing cement stations. Per EPA Cost Manual a retrofit factor of up to 50% is appropriate - so this is conservative to assume $0
Total Direct Installation Costs (DC) =		$309,750		
Indirect Installation Costs				
Engineering	0.10*PEC	$103,250		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975		Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075		
Total Installed Cost (PEC + DC + IC) =		$1,662,325		
Ductwork	250 feet	$246,989		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,909,314**		

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	43 kW for fan	$16,016	Elec. Cost= $0.0425 — 0.0425 $/kWh Warren Co 2022 cost, T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$200,683	Fuel use 37,371 MMBtu/yr gas cost $ 5.37 /MMBtu — 2022 Warren Co gas cost, T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C — C = operating labor + maintenance costs
Administration		$38,186	2% TCC
Property Taxes		$19,093	1% TCC
Insurance		$19,093	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$271,843.34	
Total Annual Cost		**$764,619**	

Basis:
1) **EPA's RTO Fact Sheet for oxidizers, *www.epa.gov/catc/clean-air-technology-center-products#factsheets*, states capital cost range of an RTO is $35-140/scfm, minimum of range selected.**
2) **Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)**
3) **EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.**

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate fo[redacted] Cement Stations =		33,000 scfm	Vent [redacted]ement stations to a single concentrator and a single RTO for control.
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$950,000	Durr Estimate in 11.12.2019 Email
Freight	0.05*EC	$47,500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$28,500	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$95,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$1,121,000	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$89,680.00	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$156,940	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$44,840.00	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$22,420	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$336,300	
Indirect Installation Costs			
Engineering	0.10*PEC	$112,100	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$56,050	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$112,100	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$22,420	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$33,630	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$347,510	
	Total Installed Cost (PEC + DC + IC) =	$1,804,810	
Ductwork	30 feet	$29,639	Minimum estimate of require ductwork. Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,834,449**	
Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	65 kW for fan	$24,023	Elec. Cost= $0.0425 — 0.0425 $/kWh Warren Co 2022 cost, T. Burnett email 12.28.2022; Operation= 8,760 hr/yr
Fuel Cost		$20,068	Fuel use 3,737 MMBtu/yr; gas cost $ 5.37 /MMBtu; 2022 Warren Co gas cost, T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift, $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Ref 3
Maintenance Labor	1 hr/shift, $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C — C = operating labor + maintenance costs
Administration		$36,689	2% TCC
Property Taxes		$18,344	1% TCC
Insurance		$18,344	1% TCC
Zeolite Replacement (Once):			
Zeolite Replacement Material Cost	4 rotor	$219,696	By Durr $200,000 per rotor + $15,000 freight, scaled from original estimate
Zeolite Replacement Labor Cost			Unknown
Zeolite Disposal Cost	4 rotor	$1,167	Assumed equal to Aiken PSR waste Disposal Cost is $0.19/lb
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$261,184.22	
Total Annual Cost		**$799,221**	

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for a disc concentrator system and single RTO rated for 33,000 scfm based on controlling three cement stations in November 2019.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 33,000 scfm — Vent[redacted]ement stations to a single concentrator and to a boiler for control.

		Cost	Cost Factor/Comments
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$775,186	2019 Cost Estimate beased on budgetary data from Durr Systems Inc.
Freight	0.05*EC	$38,759	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$23,256	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$77,519	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$914,720	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$73,178	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$128,061	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$36,589	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$18,294	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
Total Direct Installation Costs (DC) =		$274,416	
Indirect Installation Costs			
Engineering	0.10*PEC	$91,472	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$45,736	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$91,472	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$18,294	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$27,442	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$283,563	
Total Installed Cost (PEC + DC + IC) =		$1,472,699	
Ductwork			Based on venting emissions from cementer to existing boiler.
	1403 feet	$1,386,102	Reference 2, scaled

Chris Buchanan (BATO Engineering Div. Manager) email 6.07.2023 indicates a minimum distance between Cementing and Boilers of 1,403 feet

Total Capital Cost (TCC) — TCC = **$2,858,801**

		Cost	Cost Factor/Comments		
Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	43 kW for fan	$16,016	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$0	Fuel use	0	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$57,176	2% TCC		
Property Taxes		$28,588	1% TCC		
Insurance		$28,588	1% TCC		
Zeolite Replacement (Once):					
Zeolite Replacement Material Cost	4 rotor	$219,696	By Durr $200,000 per rotor + $15,000 freight, scaled from original estimate		
Zeolite Replacement Labor Cost			Unknown		
Zeolite Disposal Cost	4 rotor	$1,167	Assumed equal to Aiken PSR waste Disposal Cost is $0.19/lb		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$407,028.91			
Total Annual Cost		**$957,963**			

Basis:

1) Durr Systems Inc. provided a budgetary cost estimate for an integrated Concentrator + RTO system rated for 33,000 scfm to control three (3) cement stations ($950,000). This estimate was scaled and reduced to remove the cost of the RTO in the system.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR CEMENTING - BOILER CONTROL
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 11,000 scfm — Vent [redacted]e cement station to a boiler for control.

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$10,000	Min. Cost associated with the installation of a booster fan. (Reference 1)
Freight	0.05*EC	$500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$300	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$1,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$11,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$944	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$1,652	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$472	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$3,540	
Indirect Installation Costs			
Engineering	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$590	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$354	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$3,658	
	Total Installed Cost (PEC + DC + IC) =	$18,998	
Ductwork	1403 feet	$1,386,102	Based on venting emissions from cementer to existing boiler. Reference 2, scaled

Chris Buchanan (BATO Engineering Div. Manager) email 6.07.2023 indicates a minimum distance between Cementing and Boilers of 1,403 feet

Total Capital Cost (TCC)	TCC =	**$1,405,100**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	14 kW for fan	$5,339	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$0	Fuel use	0	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/month	$400			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$60	15% of operating labor, Reference 3		
Maintenance	1 hr/month	$454			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$454	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$820.70	0.6 * C		C = operating labor + maintenance costs
Administration		$28,102	2% TCC		
Property Taxes		$14,051	1% TCC		
Insurance		$14,051	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$200,054.58			
Total Annual Cost		**$263,786**			

Basis:
1) Engineering Judgement used to estimate cost of booster fan.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Curing VOC Control Analysis (Analyzing New Curing Bays Only for BACT Economic Feasibility)

[redacted]

$/ton avoided emissions	$81,277

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CURING
BRIDGESTONE WARREN CO

Air flow rate for Curing Press Bay = 254,500 scfm

		Cost	Cost Factor/Comments
Direct Costs			
Purchased Equipment Costs			
Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000
Scaled RTO Equipment Cost (EC_b)		$2,496,022	Scaled (Smaller RTO cost * (Larger RTO flowrate/Smaller RTO Flowrate)^0.6
Freight	$0.05*EC_b$	$124,801	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$74,881	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$249,602	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$2,945,306	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$235,624.49	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$412,343	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$117,812.24	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$58,906	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$883,592	
Indirect Installation Costs			
Engineering	0.10*PEC	$294,531	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$147,265	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$294,531	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$58,906	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$88,359	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$913,045	
	Total Installed Cost (PEC + DC + IC) =	$4,741,943	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$4,771,581**	

		Cost	Cost Factor/Comments		
Direct Annual costs					
Electricity Cost	332 kW for fan	$123,515	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$154,769	Fuel use	28,821	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$95,432	2% TCC		
Property Taxes		$47,716	1% TCC		
Insurance		$47,716	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$679,365.85			
Total Annual Cost		**$1,348,217**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. A commonly accepted approach for scaling equipment cost is to use a ratio of the equipment size with a scaling factor of 0.6. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control and low total of avoided emissions from Curing.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

From:	Lida Warden on behalf of Air.Pollution Control
To:	APC Permitting
Subject:	FW: [EXTERNAL] Bridgestone Americas 89-0077 - Redacted BATO PSD app updated
Date:	Wednesday, July 12, 2023 11:12:45 AM

2 of 2 emails

From: Terri Burnett <ftsystem@bfusa.com>
Sent: Wednesday, July 12, 2023 8:12 AM
To: Air.Pollution Control <Air.Pollution.Control@tn.gov>
Subject: [EXTERNAL] Bridgestone Americas 89-0077 - Redacted BATO PSD app updated

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Bridgestone Americas SFT Notification.

Greetings,

Attached is the updated BATO PSD Application (redacted) document. Updates encompass requested additions and updated calculations, per TDEC additional requests and requirements.

The confidential version has been received by TDEC - Air Division previously.

Please reach out if you have any questions or concerns.

Thank you,

Terri Burnett

Environmental Engineer

Bridgestone Americas, LLC - dba Warren plant

You have received a secure file message from Terri Burnett

Files attached to this message

Filename	Size	Checksum (SHA1)
FINAL 06.28.2023 BATO PSD Permit App - (public)_redacted.pdf	28.8 MB	31712ec27e0df3bc779424f13655ab6c323f9afc1df59ca23f3dad9c1c0f6381

Please click on the following link to download the attachments: https://sft.bfusa.com/message/UbxMvI5KxT8ABQS6Kx5lBu

This email or download link can not be forwarded to anyone else.

The attachments are available until: **Friday, 11 August.**

Message ID: UbxMvI5KxT8ABQS6Kx5lBu

Plain Text Plain Text (default)

Greetings,

Attached is the updated BATO PSD Application (redacted) document. Updates encompass requested additions and updated calculations, per TDEC additional requests and requirements.

The confidential version has been received by TDEC - Air Division previously.

Please reach out if you have any questions or concerns.

Thank you,

Terri Burnett

Environmental Engineer

Bridgestone Americas, LLC - dba Warren plant

You have received a secure file message from Terri Burnett The following files are attached to this message: - FINAL 06.28.2023 BATO PSD Permit App - (public)_redacted.pdf (28.8 MB), Checksum: 31712ec27e0df3bc779424f13655ab6c323f9afc1df59ca23f3dad9c1c0f6381 Please click on the following link to download the attachments: https://sft.bfusa.com/message/UbxMvI5KxT8ABQS6Kx5lBu This email or download link can not be forwarded to anyone else. The attachments are available until: Friday, 11 August Message ID: UbxMvI5KxT8ABQS6Kx5lBu

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Bridgestone SFT Appliance: https://sft.bfusa.com

From:	Lida Warden on behalf of Air.Pollution Control
To:	APC Permitting
Subject:	FW: [EXTERNAL] Access Pass: sft.bfusa.com
Date:	Wednesday, July 12, 2023 11:12:28 AM

1 of 2 emails

From: Terri Burnett <ftsystem@bfusa.com>
Sent: Wednesday, July 12, 2023 8:12 AM
To: Air.Pollution Control <Air.Pollution.Control@tn.gov>
Subject: [EXTERNAL] Access Pass: sft.bfusa.com

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Bridgestone Americas SFT — Access Pass

You have recently received a Secure Message:

- From: BurnettTerri@bfusa.com
- Subject: Bridgestone Americas 89-0077 - Redacted BATO PSD app updated
- Message ID: UbxMvI5KxT8ABQS6Kx5lBu
- Message URL: https://sft.bfusa.com/message/UbxMvI5KxT8ABQS6Kx5lBu

In order to access this message, please enter the following Access Pass in your Web Browser:

Access Pass: zQyk-eHcT-t1MA

Access Pass Email: air.pollution.control@tn.gov

Please note that this Access Pass is unique to your email: air.pollution.control@tn.gov and will be used to identify you as having accessed this message and downloaded any attachments. Please do not share this Access Pass.

Bridgestone SFT Appliance: https://sft.bfusa.com

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BRIDGESTONE
Bridgestone Americas Tire Operations
725 Bridgestone Drive
Morrison, TN 37357

June 14, 2023

Ms. Michelle Owenby, Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Re: Bridgestone Americas Tire Operations, LLC – Warren Plant
Emissions Source Reference Number 89-0077
PSD Permit Application – Revised June 2023

Dear Ms. Owenby:

This letter transmits a complete Prevention of Significant Deterioration (PSD) permit application package for an expansion project at Bridgestone Americas Tire Operations, LLC (BATO) in Morrison, Tennessee located in Warren County. This PSD application is submitted based on volatile organic compounds (VOC) being the only pollutant that triggers a requirement for a PSD permit. In summary, there are four (4) new rubber mixers, three (3) new cement stations, and one new 75 MMBtu/hr natural gas fired boiler. The attached permit application provides all the necessary documentation to complete a PSD permit application to request a construction permit.

BATO has revised the original February 2023 application in response to TNAPC's request for additional information dated May 26, 2023. Below, each item in TNAPC's request is shown in *Italics* with the response from BATO shown in **Bold** text.

Overall
Provide the actual monthly throughput data used in the baseline actual calculations (in pounds, gallons, scf, etc. per month). The data used for some of the calculations does not appear to match the data reported in the semiannual reports for that timeframe. Be sure to include actual monthly throughput data for carbon black, clay, and pigments for the railcar unloading, storage, and handling operation (Source 02) and the banbury mixers (Source 05) and natural gas/fuel oil use in just the boilers and heaters.

With this revised application, BATO is providing actual monthly throughput data used in the baseline actual emissions calculations from 2018 to 2019. An accurate accounting of all process input materials and fuels is included. The original application included data for the total Final Pigment Usage values used to calculate Particulate Emissions from the Final Pigment dust collector (B-DCEF-FP1) for the 2018 and 2019 Emissions Inventory reports using the EDL and SLEIS. The revised baseline actual emissions calculations use 2018 and 2019 Pigment totals to calculate actual emissions based on material throughput. To be more conservative and consistent with total Pigments used and tracked by BATO and reported in previous semiannual reports, the revised application includes total Pigment usage data instead of only Final Pigment usage data. This is a

better estimate of actual PM emissions since the calculation includes the PM emissions from the Final Pigment dust collector (Source 02) and the Pigment dust collectors for mixers 621, 622 and 623 (Source 05).

Railcar Unloading and Storage (89-0077-02)
The material handled, in lb/yr, through the 621 and 623 day bins was 94,000,000 (baseline actual) [see pdf page 27 of the application]. The value used in the future actual calculations for these same day bins is only 36,242,733 lbs/yr [see pdf page 88 of the application]. Should this value instead be 144,970,932 lbs/yr? Please verify this value and update the calculations and tables as needed.

BATO mistakenly utilized the material handled amount for the 621 and 623 mixers in the calculations of material handled in the 621 and 623 day bins. In Railcar Unloading and Storage (Source 89-0077-02) BATO corrected the material handled, in lb/yr, through the 621 and 623 day bins to the correct amount for the future actual emissions calculations.

Manufacturing and Material Usage (89-0077-04)
What is the projected actual usage rate, in gal/yr of Solvent (includes cement)? The usage rate was not provided in the calculations, only the emission rate.

The projected actual usage rate of Solvent (includes cement) is provided in the revised application in gal/year.

Rubber Milling and Mixing (89-0077-05)
Will there be additional banbury mill vent exhausts associated with this project?
What is the projected actual usage rate, in gal/yr of silane?

The expansion project will not include any additional banbury mill vent exhausts. The projected actual usage rate of Silane is provided in the application in gal/year.

The Title V renewal application (dated March 31, 2022) lists the following exhaust flow rates for the existing units associated with this source. These values are slightly different from those used to develop the emission factors used in your PSD determination calculations. Please verify which values are correct.

Stack ID	Flow rate (dscfm) Title V Renewal	Flow rate (dscfm) Used in EF Development
B-DCEF-621C	32,000	31,659
B-DCEF-621P	32,000	31,659
B-DCEF-622P	32,000	31,659
B-DCEF-623C	32,000	31,659
B-DCEF-623P	32,000	31,659
B-DCEF-624C	32,000	31,659
B-DCEF-625C	32,000	31,659
B-DCEF-625CL	32,000	31,659

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For each dust collector associated with Source 05, the correct flow rate was used in the calculation for emission factor development (31,659 dscfm). The flow rate value of 32,000 dscfm used in the Title V renewal application was the design flow rate in acfm for these dust collectors, and the calculation, converting to dscfm, takes into account an exhaust temperature of 70 °F and moisture content of 1%.

Boilers and Heater (89-0077-10)
Identify in the calculations for the existing boilers which emission rates are used in the PSD determination calculation (specify which calculations are Baseline Actual and which are Projected Actual or Future Potential). The calculations need to be revised as the existing boilers and heater are not equipped with low-NOx burners (based on previous permit applications). The calculations provided use the low-NOx emission factor for those units. Additionally, the emission factor for total PM should be used (filterable + condensable) for fuel oil combustion. The correct emission factor is 3.3 lb/1000 gal. The heat content of No.2 fuel oil is 140,000 Btu/gal (per AP-42).

For the proposed boiler, which must be equipped with low-NOx burners, you may use a NOx emission factor of 16 lb/1000 gal for fuel oil combustion (per Division guidance on low-NOx burners).

For existing boilers, the baseline actual emissions calculations are those emissions calculations based on the total NG and No.2 Fuel Oil Burned in 2018 and 2019. For the Future emissions for the PSD determination, it was chosen that the existing boilers projected actual emissions equaled the baseline actual emissions from 2018 and 2019. This is because the existing boilers are already utilized at their maximum capacity. Future Potential (PTE) was used for the proposed boiler. BATO reviewed equipment specifications and documentation in their records for the existing boilers, and determined that the burners on these two Babcock and Wilcox boilers are indeed Low NOx burners as indicated in the specification cut-sheets for the boilers included in this application.

With regard to the Insignificant Activities/Emission Units, BATO has addressed each of these activities in the revised BACT Analysis, and has provided an emission limit proposed as BACT for each source.

TNAPC stated in the May 26, 2023 request for additional information "*BACT only applies to the new emission units associated with this expansion. The additional information requested below for each source only pertains to those new units. Any economic analysis which includes control of existing units may be removed from the updated BACT analysis.*"

Our understanding is that since due to the increased tire production, all existing emission units in manufacturing will experience higher throughputs, this BACT analysis must evaluate the emissions associated with the Project from both new and existing emission units. BATO does not see benefit in arguing that the expansion of the plant would not result in "debottlenecking" of existing emissions units. Therefore, the updated BACT analysis includes the existing units and the new units.

Each of the requested items that TNAPC noted for additional information necessary to include in the BACT analysis is addressed in this submission.

Please contact Spencer Hissam (Stevens EHS Consulting, 615-772-3865) or Ms. Terri Burnett (615-668-5500, X1033) if you have any questions or need additional information.

Sincerely,
Bridgestone Americas Tire Operations, LLC
Warren Plant

Terri Burnett
Senior Environmental Manager

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BRIDGESTONE
Bridgestone Americas
Tire Operations
725 Bridgestone Drive
Morrison, TN 37357

June 14, 2023

Tennessee Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Re: Permit Agreement Letter
Bridgestone Americas Tire Operations, LLC – Warren Plant
725 Bridgestone Drive, Morrison, TN 37357
Emissions Source Reference Number 89-0077 / Permit No. 569874

Dear Ms. Owenby:

On behalf of Bridgestone Americas Tire Operations, LLC – Warren Plant (BATO-Warren), the following permit limitations are agreed upon for the proposed expansion of the rubber tire manufacturing operations at the above referenced facility:

- Maximum annual production shall not exceed [redacted] during all intervals of 12-consecutive months.
- VOC emitted by this facility shall not exceed 553.8 tons during all intervals of 12-consecutive months.

The facility has elected to opt-out of being a major source of Hazardous Air Pollutants (HAPs).

- Any single HAP, listed pursuant to Section 112(b) of the Federal Clean Air Act, emitted by this facility shall not exceed 9.9 tons during all intervals of 12-consecutive months.
- Total HAPs emitted by this facility shall not exceed 24.9 tons during all intervals of 12-consecutive months.

The following limits are agreed upon avoid PSD/New Source Review.

- Particulate Matter emitted by this facility shall not exceed
  - 44.90 tons PM_{Total} during all intervals of 12-consecutive months.
  - 44.90 tons PM_{10} during all intervals of 12-consecutive months.
  - 34.81 tons $PM_{2.5}$ during all intervals of 12-consecutive months.
- SO_2 emitted by this facility shall not exceed 79.04 tons during all intervals of 12-consecutive months.
- NO_x emitted by this facility shall not exceed 110.02 tons during all intervals of 12-consecutive months.

- CO emitted by this facility shall not exceed 88.8 tons during all intervals of 12-consecutive months.

Source 89-0077-10

- Total heat input for this source (three boilers and one heater) shall not exceed 235.3 MMBtu/hr.
- Total usage of No. 2 Fuel Oil shall not exceed 7,339,364 gallons during all intervals of 12-consecutive months.

BATO-Warren shall demonstrate compliance with these limitations by:

- Recordkeeping of a monthly facility production log.
- Recordkeeping of Monthly Total VOC emissions from the facility as indicated in conditions E3-8, E5-1, E6-3, and E12-1 of the current permit.
- Recordkeeping of Monthly Total HAPs emissions from the facility as indicated in condition E3-7 of the current permit.
- Maintenance of PM control devices and only operating with the use of PM control devices.
- Recordkeeping of Monthly Fuel Usage / Emissions Log for Source 89-0077-10 (LOG 10) and Yearly Emissions Log for Source 89-0077-10 (LOG 11) with the method of calculations as indicated in condition E7-10 of the current permit.
- Only natural gas and No. 2 Fuel Oil shall be used as a fuel for source 89-0077-10.

Should you have any questions or require additional information, please contact Terri Burnett via phone at 931-668-5500, X1033 or via e-mail at BurnettTerri@bfusa.com.

On behalf of BATO-Warren, I agree to the above limitations. I am authorized to represent and bind the facility in environmental affairs.

Sincerely,

Signature [signature]

Name (printed) Tim Painter

Title Plant Manager

Date 6-21-23

Bridgestone Americas Tire Operations, LLC
Warren Plant

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PSD Permit Application
Engineering Report
February 2023
REVISED – June 2023

Prepared for:
Bridgestone Americas Tire Operations, LLC
725 Bridgestone Drive,
Morrison, TN 37357

Emissions Source Reference Number 89-0077 /
Permit No. 569874

BRIDGESTONE

Prepared by:
Spencer Hissam, P.E. & Hunter Hill, P.E.
Stevens EHS Consulting, LLC
121 Windham Drive
Hendersonville, TN 37075
(615) 772-3865

STEVENSEHS CONSULTING

TABLE OF CONTENTS

List of Tables

I. INTRODUCTION AND BACKGROUND

Bridgestone Americas Tire Operations, LLC (BATO) proposes a production expansion project (the Project) at its rubber tire manufacturing plant in Morrison, TN. The plant is an existing major source with a Title V operating permit (TVOP) issued by the Tennessee Division of Air Pollution Control (TNAPC), Permit 569874 effective October 16, 2017, through October 15, 2022. The plant submitted a Title V renewal application on April 6, 2022. The plant began operations in the early 1990's under TNAPC issued construction permits. The facility has implemented numerous small production expansion projects but has operated as a PSD minor source until 2017.

In 2017, BATO submitted an application requesting a construction permit to include injection of silane into certain rubber compounds to produce silica-based rubber. TNAPC issued a minor permit modification for that change on November 6, 2017. The allowable VOC emissions identified on that permit were in excess of the PSD applicability thresholds. Therefore, the plant became a major PSD source. VOC is regulated as a precursor for ground-level ozone formation. A major stationary source that is major for VOC or oxides of nitrogen is major for ozone.

The Project will include installation of new emissions units with the goal of increasing daily tire production capability to [redacted]. Additionally, with the increased tire production, all existing emission units in manufacturing will experience higher throughputs. This document evaluates the emissions associated with the Project from both new emission units and existing units and concludes that the Project triggers PSD permitting requirements. It then addresses the elements required in a PSD permit application.

On May 26, 2023, BATO received an additional information request from Mr. Justin Dolzen from TNAPC. In response to this request, BATO is revising this application in an effort to address TNAPC's concerns.

II. SCOPE OF THE PROJECT

The objective of the Project is to increase the daily tire production capacity of the facility.

A. New Units Required for the Project

The Project will include the installation of additional units in the following permitted emission sources:

- *89-0077-02 – Railcar and Trailer Unloading, Storage, and Holding.* A new railcar unloading station and 10 new carbon black silos are proposed to be installed.

- *89-0077-04 – Manufacturing and Material Usage.* New Extruders, Calendars, and additional Cement Stations are proposed to be installed.

- *89-0077-05 – Rubber Mixing and Milling.* Four additional mixers ([redacted]) with fabric filter dust collectors for particulate control from Carbon Black loading ([redacted].) Dust Collectors for raw materials like clay and pigment are also proposed where needed. No new banbury mill vent exhausts will be installed for the expansion.

- *89-0077-10 – Powerhouse.* One additional 75 MMBtu/hr Boiler (PH-BEF-004.)

- *89-0077-22 – Tire Curing.* The installation of one (1) additional tire curing bay.

The Project is scheduled to begin actual construction in late 2023, with start-up expected for early- to late- 2025.

B. Impacts on Existing Units

In order to sustain increased tire production, all of the existing equipment associated with manufacturing operations will also experience increases in throughput and increased production rates.

The Diesel Driven Emergency Engines (89-0077-18 and -19), the Diesel Driven Fire Pump Engines (89-0077-20), and the Gasoline Storage Tank (89-007-21) are not affected by the Project. They are not included in the analysis.

III. EMISSIONS SUMMARY

The proposed Project will have the potential to emit regulated air pollutants including Particulate Matter (PM), PM_{10}, $PM_{2.5}$, sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and greenhouse gases [methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2)]. A facility-wide emissions summary in included with the attached forms.

In the past, particulate emissions from Emissions Sources 02 and 05 were calculated using an extremely conservative mass balance, using assumptions for the percent of material vented from the process to the dust collection units. Additionally, assumptions were made regarding the size distribution of the emissions consistent with sieve analysis of the product. These emission rates were developed in this manner to determine compliance with Tennessee Air Pollution Control Rules and to calculate emission-based fees.

During the development of this permit application, BATO looked more closely at the calculation methodology to determine PSD applicability. Emission Factors were developed using the following assumptions:

1. A reasonable particulate matter exhaust grain loading of 0.01 gr/dscf from each dust collection system.
2. Flow rates for each dust collection system were based on the maximum design capacity for the individual system.
3. Material throughput rates for each process were based on the maximum hourly design capacity for the individual system.
4. A conservative assumption that PM_{10} emissions are equivalent to PM_{Total}.
5. An assumption that $PM_{2.5}$ emissions are 23% of PM_{Total}. This particle distribution was taken from Appendix B-2, Generalized Particle Size Distributions, of AP-42.

A PM Emission Factor (lb PM/lb Matl) for each emission point was calculated by determining a maximum hourly emission rate (lb PM/hr), then diving that value by the maximum hourly throughput (lb Matl/hr). A table showing the development of these emission factors is included with the application forms.

These emission factors were used to calculate past actual emissions, potential emissions, and future actual emissions. In this manner, a net emission increase was determined using a consistent calculation methodology.

TNAPC requested that BATO verify the correct flow rate values for the existing dust collector units associated with Source 05. For each dust collector, the correct flow rate was used in the above calculation for emission factor development (31,659 dscfm). The flow rate value of 32,000 dscfm used in the Title V renewal application was the design flow rate in acfm for these dust collectors, and the calculation, converting to dscfm, takes into account an exhaust temperature of 70 °F and moisture content of 1%.

IV. REGULATORY APPLICABILITY

A. Prevention of Significant Deterioration

PSD is a preconstruction permit program. A PSD permit is required if the actual emissions increase associated with a project results in both a significant emissions increase and a significant net emissions increase,[1] determined in a two-step process. The Project is a "hybrid" project, because it involves both construction of new emission units and effects on existing emission units. The existing emission units, however, are not being physically modified as a result of the Project. The two-step process for hybrid projects is as follows:

Step 1 – Increase from the Project – Does the proposed project, by itself, result in a *significant emissions increase*? For new units, the increase is the potential to emit (PTE) for the new units.[2] For affected existing units, the increase equals the difference between projected actual emissions (PAE) and baseline actual emissions (BAE).

Step 2 – Net Emissions Increase Across the Plant – If the answer to Step 1 is "yes," does the proposed project also result in a *significant net emissions increase* considering contemporaneous and creditable projects undertaken in the preceding 5 years through when the proposed project becomes operational?

1. Potential to Emit – New Units

PTE means the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design.[3] The PTE for the new emission units associated with the Project is presented in the attached forms.

The calculation of PTE for the new units is straightforward. Unlike other stationary sources, such as certain chemical plants or utilities, the tire manufacturing plant does not have atypical emissions associated with startup or shutdown operations that require accounting in the analysis.

- **89-0077-02 – New railcar unloading and silos** – Particulate emissions result from the unloading and storage of dry raw materials.
- **89-0077-04 – New Cement Stations** – Emissions from the cement stations are VOC from the use of adhesive.
- **89-0077-05 –** [redacted] **626, 627, and** [redacted] – Particulate emissions result from the addition of dry raw materials. Emissions are estimated using a grain loading estimate to develop accurate emission factors as shown in the attached forms. Mixing and milling operations also emit VOC from rubber.
- **89-0077-10 – Boiler #3 (75 MMBtu/hr) –** Products of combustion are estimated using AP-42 emission factors. The unit will fire natural gas with No. 2 fuel oil as a back-up. No. 2 Fuel oil combustion for this unit will be limited to 2,339,364 gallons per rolling 12 months.

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1 Tennessee Air Pollution Control Rule 1200-03-09-.01(4)(a)2.
2 There is an exception for replacement units that is not applicable here.
3 Tennessee Air Pollution Control Rule 1200-03-09-.01(4)(b)5.

- **89-0077-22 – Tire Curing –** Emissions from the curing presses are VOC.

2. ***Projected Actual Emissions – Existing Units***

- **89-0077-02 – Railcar and Trailer Unloading, Storage, and Holding** – Particulate emissions from increased throughput of dry raw materials. In the original application, the material handled (lb/yr) through the 621 and 623 day bins was mistakenly indicated as the volume of material that is transferred at the 621 and 623 mixers. This volume has been increased in the revised calculations to show the accurate amount of projected material handled for these day bins.
- **89-0077-04 – Cement Stations** – VOC emissions from increased production rates. The Maximum Projected actual usage rate of Solvent (includes cement) = [redacted] lb/year = [redacted] Gal/year.
- **89-0077-05 – Mixers and associated Tire Manufacturing equipment** – VOC emissions and Particulate emissions from increased production rates. The Maximum Projected actual usage rate of Silane = [redacted] gal/year.
- **89-0077-10 – Boilers 1 and 2** – assumed PAE = BAE in 2018 and 2019 for existing boilers. The existing boilers are already utilized at their maximum capacity in 2018 and 2019, and the new boiler is necessary for the expansion of the plant.

A summary of the projected actual emissions (*PAE*) for each affected emission unit is provided in Table 1 below. The facility agrees to limit plant-wide VOC emissions to no more than 553.8 tpy.

3. ***Baseline Actual Emissions***

The representative, 24-month consecutive period selected to establish BAE is January 2018 through 2019. The calculations did not require any downward adjustments for noncompliance. BATO has operated in compliance with the limits expressed in its permits. Actual emissions calculations are included in Appendix A. BATO has also provided the actual monthly throughput data used in the baseline actual calculations (in pounds, gallons, scf, etc. per month). This data includes carbon black, clay, and pigments for the railcar unloading, storage, and handling operation (Source 02), the banbury mixers (Source 05), and natural gas/fuel oil use in just the boilers and heaters (Source 10).

TNAPC stated in their May 26, 2023 request for additional information that the existing boilers and heater **are not** equipped with low-NOx burners (based on previous permit applications). After review of the existing Boiler specifications from Babcock and Wilcox, these boilers **are in fact** equipped with Low-NOx burners. The Baseline Actual Emissions have been revised, however, to reflect the correct NOx emission factor for the Hydronic Heater Unit and the correct total PM emission factor for fuel oil combustion for each of the boilers and heater.

4. Summary of Step 1 NSR Analysis

The following table summarizes the results of the Step 1 calculus of the emissions increase:

$$\text{Increase} = \text{PTE}_{\text{NewUnits}} + \text{PAE} - \text{BAE}$$

Table 1: Emissions Increases

Pollutant	89-0077-02 Railcar and Trailer Unloading, Storage, and Holding			89-0077-05 Rubber Mixing and Milling			89-0077-10 Boilers and Heater			Total
	Baseline (tpy)	Future (tpy)	Increase (tpy)	Baseline (tpy)	Future (tpy)	Increase (tpy)	Baseline (tpy)	Future (tpy)	Increase (tpy)	Increase (tpy)
Particulate Matter (PM_{Total})	1.14	1.78	0.64	5.73	11.32	5.59	1.75	6.84	5.09	11.31
Particulate Matter ($PM_{10total}$)	1.14	1.78	0.64	5.73	11.32	5.59	1.75	6.84	5.09	11.31
Particulate Matter ($PM_{2.5total}$)	0.26	0.41	0.15	1.32	2.60	1.29	1.75	6.84	5.09	6.52
Nitrogen Oxides (NO_x)	0.00	0.00	0.00	0.00	0.00	0.00	11.49	38.28	26.79	26.79
Carbon Monoxide	0.00	0.00	0.00	0.00	0.00	0.00	19.08	46.13	27.05	27.05
Sulfur Dioxide (SO_2)	0.00	0.00	0.00	0.00	0.00	0.00	0.30	25.31	25.01	25.01
CO_2 Equivalent (CO_2eq)	0	0	0	0	0	0	27,253	73,337	46,083	46,083
VOC*	0.00	0.00	0.00	206.18	553.8 (See Note)	347.57	1.25	3.02	1.77	349.35
Lead (Pb)	0.00	0.00	0.00	0.00	0.00	0.00	1.23E-04	1.68E-03	1.55E-03	1.55E-03

Note: * The VOC emissions listed for Mixing and Milling include total VOC from:
89-0077-04 Manufacturing and Material Usage
89-0077-05 Rubber Mixing and Milling
89-0077-22 Tire Curing

The results indicate that the increase in VOC emissions exceeds the significance threshold of 40 tons per year. The threshold is not exceeded for any other pollutant.

5. Step 2 – Net Emissions Increase Across the Plant

In this step, the project is evaluated to determine if it also results in a ***significant <u>net</u> emissions increase*** considering contemporaneous and creditable projects undertaken in the preceding 5 years through when the proposed project becomes operational.

The only contemporaneous project is the installation of new curing presses identified in an application for a Minor Permit Modification submitted in July 2018, for which TNAPC issued Minor Modification #3 on November 15, 2018. The VOC increase associated with this modification was 10.9 tpy. Therefore, the significant net emissions increase for VOC related to the Project is 349.38 tpy + 10.9 tpy = 360.3 tpy. This VOC increase exceeds the PSD significance threshold of 40 tons per year. No other contemporaneous increases or decreases were identified to consider in the analysis.

6. Emissions Summary

The Project results in a significant net emissions increase of VOC (as a precursor to ozone formation), and triggers PSD review for VOC. Thus, a BACT analysis will be performed for the new VOC emitting units and an ambient air impact analysis will be performed for ozone.

B. New Source Performance Standards

There are no new NSPS applicable to the facility as a result of the Project.
TAPCR 1200-03-16-.60 - Rubber Tire Manufacturing Industry and
40 CFR 60 Subpart BBB - Standards of Performance for the Rubber Tire Manufacturing.
Both standards indicate that the "tire" has dimensions for the "bead diameter of less than or equal to 19.7" and "a cross-section dimension less than or equal to 12.8." BATO Warren tire beads are 22.5" in diameter or greater. Applicability requires that both criteria have to be met.

C. National Emissions Standards for Hazardous Air Pollutants

There are no new NESHAP applicable to the facility as a result of the Project. As stated in the attached agreement letter, BATO opted-out of major source classification for HAPs in order to avoid 40 CFR 63 Subpart XXXX (National Emissions Standards for Hazardous Air Pollutants: Rubber Tire Manufacturing).

D. Tennessee Air Pollution Control Regulations

There are no new regulations applicable to the facility as a result of the Project.

E. Compliance Assurance Monitoring (CAM) - 40 CFR 64

The dust collection units at this facility are exempt from the CAM rules because they meet the definition of "Inherent Process Equipment" as defined in 40 CFR 64.1. EPA guidelines provide three questions to determine whether a device must be treated as a control device or inherent to the process. These questions are explained in a letter dated November 27, 1995, from David Solomon, Acting Group Leader for the Integrated Implementation Group of the EPA Office of Air Quality Planning and Standards. The questions are as follows:

1. Is the primary purpose of the equipment to control air pollution?

2. Where the equipment is recovering product, how do the cost savings from the product recovery compare to the cost of the equipment?

3. Would the equipment be installed if no air quality regulations are in place?

The primary purpose of the dust collection units is for product recovery. Without the units, BATO would experience significant cost related to the loss of material. The units would be included in the design and operation of the facility if the air pollution regulations were not applicable. Therefore, BATO considers these units as inherent process equipment for the purposes of CAM applicability and are exempt from the CAM rule.

V. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

As part of PSD review, the applicant must demonstrate that the new or modified emission units meet Best Available Control Technology (BACT) for the pollutants for which a significant net emissions increase occurs.[4]

The only pollutant for which the Project results in a significant net emissions increase is VOC. A BACT analysis is required for VOC emissions from all manufacturing equipment with increased VOC emissions related to the project.

BACT is an emission limitation based on the maximum degree of reduction for each pollutant subject to the PSD requirements taking into account the energy, environmental, and economic impacts on the source. This analysis is conducted in accordance with the *"Top-Down"* guidance in the 1990 draft EPA *New Source Review Workshop Manual* (the Manual).

Reductions may be determined through the application of available control technologies, process design, and/or operational limitations. Such reductions may be necessary to demonstrate that the emissions remaining after application of BACT will not cause or contribute to significant deterioration of air quality, thereby protecting public health and the environment.

The "Top-Down" approach in the Manual is summarized as the following 5-step process:

Step 1: Identify all control technologies.
Step 2: Eliminate technically infeasible options.
Step 3: Rank remaining control technologies by control effectiveness.
Step 4: Evaluate the most effective controls and document results.
Step 5: Select BACT.

[4] Tennessee Air Pollution Control Rule 1200-03-09-.01(4)(j)2.

BACT – Gas-Fired Boilers

VOC emissions from the boilers result from incomplete combustion caused when some of the fuel is only partially burned.

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for natural gas combustion sources:

No.	Control Alternative	Control Alternative Category
1	Catalytic oxidation	Add-on control
2	Clean fuel and good combustion	Proper operation

The most stringent control technology used to control CO emissions from combustion is catalytic oxidation, and these catalytic oxidation systems are also used to reduce VOC and organic HAP emissions. As the exhaust gas contacts the catalyst, the catalyst promotes the oxidation of CO and hydrocarbon compounds to form carbon dioxide (CO_2) and water (H_2O) as follows:

$$2\ CO + O_2 \rightarrow 2\ CO_2 + \text{heat [320 Btu/ft}^3\text{]; or}$$

$$CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O + \text{heat [907 Btu/ft}^3\text{] (if methane is present).}$$

BATO did not identify any lower emitting fuels or burner configuration technologies that would reduce VOC emissions from the proposed boiler.

Step 2: Eliminate technically infeasible options.

Catalytic oxidation of VOC in the exhaust of the boiler tubes would require a catalyst bed. Such systems are available, and can be installed as a modular unit in the boiler exhaust duct or stack. For a catalytic oxidation system to operate correctly, the exhaust gas must contain an amount of excess O_2 (typically 15%) and must be within a particular temperature range (typically between 500°F – 1250°F) depending on the type of catalyst material used. Exhaust gas temperatures that are too high may cause permanent damage to the catalyst, while operating temperatures that are too low result in a lower CO conversion efficiency. In the case of the natural gas boiler chosen, the exhaust temperature is less than the low end of the temperature window, and would require re-heating of the flue gas. This would increase natural gas use and associated criteria pollutant emissions and be cost-prohibitive. The oxidation catalyst would also convert CO emissions to CO_2. Installing a boiler VOC emissions control technology that will result in an increase in CO_2 emissions runs counter to the CO_2 emissions reduction goals of the current EPA administration. AP-42 Section 1.4 does not list catalytic oxidation as a control technology for natural gas boilers. The Boiler MACT does not require VOC emissions controls on gas-fired boilers. The potential VOC emissions from the new 75.0 MMBtu/hr boiler are less than 2 tpy. Consequently, due to the fact that this technology is not in use on small, natural-gas fired boilers, is not required by the federal Boiler MACT rule, and would not likely be effective at controlling such a low level of VOC emissions, this technology was eliminated from further consideration in this BACT analysis.

A search of EPA's RBLC was performed that included recent VOC BACT determinations for small industrial gas-fired boilers. BACT is generally good combustion practices for small gas-fired boilers. Although a few entries noted flue gas recirculation was used, this is a NO_x control technology, not a VOC control technology. One result of the RBLC search was a 100 MMBtu/hr natural gas-fired auxiliary boiler at the Nemadji Trail Energy Center in Wisconsin. This unit was installed as part of a utility power generation plant, and the facility triggered PSD review for NO_x, CO, PM, VOC, and CO_{2e}. After reviewing the BACT analysis in the preliminary determination for this source, the BACT selected for this boiler was an oxidation catalyst; however, it was primarily selected for control of CO emissions in the PSD review, and it would not have been economically feasible for the control of VOC alone. BACT for boilers at utility power plants is generally more stringent and not feasible as BACT for boilers in industrial applications.

Given the extremely low level of emissions from this boiler and corresponding low-level VOC concentration in the gas, add-on catalytic oxidation controls, while perhaps technically feasible on a theoretical basis, are not considered feasible in actual practice for external combustion sources fired with natural gas. Moreover, review of available control technologies for combustion sources at tire manufacturing plants provided no examples of add-on controls for the reduction of VOC emissions from natural gas-fired equipment. Thus, add-on VOC controls such as catalytic oxidation were determined not to be available and are considered to be technically infeasible.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

The only remaining control technology is good combustion practices & controls; and there are no environmental, energy, or economic impacts that would weigh against its use. Proper burner design and boiler tuning will minimize the VOC generated in the products of combustion. No add-on controls were considered feasible or were found in research of similar sources at other tire manufacturing plants. Furthermore, no auxiliary equipment is needed for this control option on commercial and industrial boilers with proper maintenance of the burner/boiler package and burning only clean gas as fuel. Therefore, annual tune ups are considered good combustion practices.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the boilers to be clean fuels and good combustion practices. The total VOC PTE from all new and existing boilers and one Hydronic Heater is 5.56 tons per year.

BACT – Mixing, Extruding, Calendaring, Cementing, and Curing

VOC emissions result from oils added to the rubber compounds in the mixers, solvent usage in the cement stations; and the vulcanization process in the curing presses.

MIXING Source 05

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for mixing:

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Alternative Materials (silane replacement)	Source reduction
8	Best Work Practices	No Control (PP)

A search of EPA's RACT/BACT/LAER Clearinghouse (RBLC) was conducted in December 2022 to identify the emission control technologies that were imposed by permitting authorities as BACT within the past ten years for emission sources comparable to the proposed expansion at the BATO facility. The RBLC search results returned several BACT Analysis performed at tire manufacturing facilities focused on the rubber mixing process primarily. The RBLC search results were compared to permits issued to other tire manufacturers to capture any additional permitted controls that may be required, but not included in the RBLC search results. A summary of the RBLC database search results is provided in the table below.

RBLC Search Results

Process Type: 99.015 Rubber Tire Manufacturing and Retreading

Regulated Pollutant VOC

Facility Name	State	Permit Date	Last Updated	Process Name	BACT Control Method
Cooper Tire & Rubber Company	AR	09/10/2019	11/10/2020	Upgrade Mixer #8	RTO
Bridgestone Aiken County PSR Plant	SC	05/15/2017	05/15/2017	Mixers, Milling, Extrusion equipment,	Work Practice Requirements

Facility Name	State	Permit Date	Last Updated	Process Name	BACT Control Method
				Curing, Final Inspection, Boiler(B2)	
Goodyear Tire & Rubber Company	KS	02/13/2017	08/10/2017	Mixer	RTO
Goodyear Tire & Rubber Company	VA	12/03/2014	05/05/2016	Rubber Mixing	RTO
Michelin US8 Facility	SC	12/13/2012	05/05/2016	Rubber Mixing	Work Practice Requirements for solvent usage and handling
Goodyear Tire and Rubber Co Lawton Tire Plant	OK	10/10/2012	11/07/2016	Banbury Mixing	RTO

Step 2: Eliminate infeasible options.

The most common add-on VOC control measure applicable to these emission units is the use of a regenerative thermal oxidizer (RTO) to destroy VOC in the exhaust of the emission source. These units employ a design that efficiently retains heat generated in the combustion chamber. The RTO is the most commonly utilized add-on control technology for the following reasons:

(1) The control efficiency provided by an RTO is comparable to other types of add-on control units;

(2) Due to the efficiency of the unit, the RTO has a limited impact to the environment. They require less supplemental fuel and electricity. They do not produce other wastes, such as scrubber water or hazardous waste;

(3) They function effectively in almost any normal production scenario; and

(4) They are often the most cost-effective control measure.

There may be specific challenges with utilizing most add-on control technologies. Capture efficiency for VOC emissions from Rubber Mixers is estimated at 85% and in summary is due to the fact that the lower “Batch Out” door of the mixer has a configuration that must be open for production, and cannot be effectively hooded. A large amount of air is required to collect the small portion of VOC generated and released from the “Batch Out” door. This large air flow would result in a dilute air stream with a small amount of VOC, and is usually exhausted to atmosphere without control. (See Appendix C for more detailed information on Rubber Mixer Capture Efficiency). Controls other than an RTO may be available such as recuperative thermal oxidizers, regenerative catalytic thermal oxidizers, flares, wet scrubbers, and biofiltration; however, these controls have not been used and proven effective in the tire industry. One example is that recuperative thermal oxidation has not been used in the tire industry because of the low concentration emission stream loading and highly variable flow. These specific challenges are described below, but the RTO is assumed to be the most effective and economical of the add-on controls. A condenser unit has not been demonstrated as effective at any tire plants for control of mixer emissions, and would not likely provide sufficient control of the low concentration, high flow exhaust stream from the mixer process. In addition, the VOCs condensed out of the exhaust flow would require disposal or further control with destruction. Therefore, BATO has not considered refrigerated VOC condensers further for this BACT analysis.

Existing boilers at the facility could control a small volume of Mixer exhaust flow, but not more than 7,000 scfm of Mixer exhaust flow per boiler (based on boiler rating of 75 MMBtu/hr requiring 14,100 scfm of combustion air at 15% excess air and 11.5 scf of air per scf of natural gas burned). With the current design basis of the Mixer exhaust (31,659 dscfm) going to either a Clay, Carbon Black, or Pigment dust collector for particulate matter emission control and material collection, control of only 7,000 cfm of exhaust air on two mixers would be ineffective.

Based on our review of the RBLC and knowledge of the industry, absorbers/wet scrubbers have not been determined effective and have not been installed for control of VOC emissions from mixing at tire plants. Although ethanol is a large component of the mixing VOC emissions and is water soluble, this technology is not feasible for the BATO Warren plant because the exhaust flow from mixing is extremely high. Absorbers are best suited to high concentration, low-flow applications for VOC control. Additionally, the plant does not have a way to treat the wastewater effluent that would result from the use of this technology since there is no wastewater treatment system onsite. Therefore, wet scrubber/absorption technology was not considered further.

Adsorption with activated carbon is another VOC emissions control technology in which VOCs are attracted to and bind to the surface of activated carbon and remains in the carbon until it is desorbed or reclaimed. A well designed adsorber system is capable of achieving 95% to 98% control efficiency at input concentrations between 500 and 2,000 ppm in air (US EPA, May 1999. CATC Technical Bulletin). An adsorber becomes nearly useless when inlet concentration gets so low that the VOC will not be effectively adsorbed. Explosions or fires in the carbon bed may occur if the concentration of the organics in the waste gas is not maintained substantially below the LEL of the specific compound being controlled. Carbon adsorbers have not been successful for controlling VOC emissions from tire manufacturing operations because solid adsorption media are susceptible to plugging by the PM given off by the process. While BATO's mixers are vented first to dust collectors for PM control, the tire processing oils would not be able to be removed from carbon. Furthermore, carbon adsorption would produce two waste streams as the carbon beds become saturated and replaced and the recovered solvent containing VOCs is not able to be reused. Therefore, carbon adsorption is determined to be not technically feasible.

A few Goodyear tire plants have installed RTO's for VOC emissions from mixing. It is our understanding (based on a review of permitting documents) that the RTOs were installed in part to respond to a compliance order and in part to allow them maximum flexibility to increase silane usage and emissions. However, it does appear from review of the available information that the Goodyear facilities have limited their operational flexibility by specifying what materials are to be mixed in each mixer at each plant and only applying RTO control to certain mixers that have the highest emission rates (e.g., RTOs are only feasible on certain mixers if production is constrained in a certain way).

Because other tire plants have installed RTOs for mixing, BATO considered RTOs on each of the 9 mixers with a proportional amount of silane usage for each mixer. A second scenario considered was installing 4 larger RTO's on 4 pairs of mixers each using a proportional amount of silane per year. It's possible that particulate in the exhaust of the mixers would blind a concentrator wheel; however, BATO has considered the option to install a combined system in series that would accept all exhausts from the 4 new mixers in the concentrator wheel(s) and exhaust to a single RTO. Another configuration that was considered was a system exhausting 4 new mixers and 2 existing mixers to three concentrator wheels in series with a single RTO. Each of these configurations shows a BACT control cost >$12,000/ton VOC Emissions avoided as shown in Appendix B. In addition, BATO considered the option to install an RTO on 2 of the new mixers and assumed that these 2 mixers would be selected to process all Silane for the facility. The BATO Warren permit does not currently limit how each of its mixers is used. Tread can be mixed in any mixer. Flexibility in operations is needed in the plant to allow capability to be able to mix any type of rubber compound in any mixer and to be able to use the tire "recipe" components necessary to produce the types of tires their customers demand and to be able to reach the design capacity. The type and amount of silane used in BATO's tires has changed over time and BATO has experienced an increase in demand for tires that are manufactured using silane. Silane is added during the tread mixing process in order to impart certain characteristics to the rubber (tread) being mixed. Ethanol is emitted as the silane reacts with the rubber compound in the presence of high temperature and moisture. BATO has not evaluated redesigning the mixing process so that only certain mixers are used for mixing activities with higher VOC emissions potential using silane. We do not believe that redesigning or constraining the process in that way is required as part of a BACT analysis and would limit the overall production capability of the plant. Continued operational flexibility and lack of restriction on product flow within the plant is vital to maintaining BATO's current production rates and product quality. A review of the cost of each of these configurations mentioned above proved to be excessive as shown in Appendix B.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Based on this analysis, mixing emissions would be most effectively controlled by an RTO; however, this add-on control technology is not economically feasible based on the cost to install and operate the equipment. All other add-on control technologies listed are considered not technically feasible. Best work practices have been chosen as the best alternative to add-on control technologies for VOC emissions from Mixing.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the new mixing units is no control. Good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC materials where possible, cleaning up spills, and minimizing cleaning with VOC compounds should be implemented as BACT to control VOC emissions from all equipment associated with Source 05. BATO proposes an emission limit of 180.62 TPY as BACT for Source 05.

MANUFACTURING & MATERIAL USAGE Source 04

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emissions controls for milling, calendars, extruding, and cement stations.

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Alternative Materials (silane replacement)	Source reduction
8	Best Work Practices	No Control (PP)

The RBLC search described previously applies to these sources and to tire curing as well, and did not identify any additional control technologies as BACT.

Step 2: Eliminate infeasible options.

As with mixing emissions, the most effective add-on VOC control measure applicable to these emission units is the use of an RTO to destroy VOC in the exhaust of the emission source. This is due to the high control efficiency of RTO's, the overall efficiency of RTO's using less electricity and less fuel, the ability to control emissions without generating a waste such as scrubber water or hazardous wastes. RTO's function effectively in normal production scenarios, and they are often the most cost-effective control measure. A condenser unit has not been demonstrated as effective at any tire plants for control of manufacturing emissions, and would not likely provide sufficient control of the low concentration, high flow exhaust streams required to capture emissions from the milling, calendaring, extruding, and cement station processes. In addition, the VOCs condensed out of the exhaust flow would require disposal or further control with destruction. Therefore, BATO has not considered refrigerated VOC condensers further for this BACT analysis.

The milling, calendaring, and extruding processes that are currently fugitive, would require a large volume of exhaust air in order to be effectively captured and the existing boilers are only able to accept a small volume of exhaust air for control inside the combustion chamber as described in the section for Mixing emissions. Control of the low concentration and low volume relative to the overall volume of exhaust air that must be captured would be ineffective at controlling emissions from these sources.

For the new cement stations, with a current design basis that includes exhausting at an approximate flowrate of 11,000 cfm per cement station, BATO chose to evaluate two possible configurations for control with the existing boilers. The first configuration includes a single Zeolite concentrator wheel for all three new cement stations followed by one of the existing boilers for control. This configuration includes a conservative estimate of the required ductwork of 1,403 feet which is the minimum straight-line distance from the nearest new cement station to the boilers. We conservatively assumed 100% capture for this configuration, and cost of control was not economically feasible based on 95% control efficiency of the Concentrator & Boiler control system. The second configuration assumes that each of 3 new cement station can be exhausted separately to each of the two existing boilers and to the third proposed boiler. This configuration assumes that at least 1,403 feet of ductwork will be needed for each new cement station to be exhausted to the boiler area (total ductwork of 4,209 feet). For optimal boiler performance, we originally assumed this configuration would only be able to capture about 35% of the Cementer emissions based on the boilers being rated at 75 MMBtu/hr which equates to approximately 73,500 scf/hr of natural gas combusted. (Originally, we estimated total Capture/control efficiency = 35% Capture x 95% VOC Destruction = 33.3%). With a design of 15% excess air, it takes about 11.5 scf of air per scf of natural gas combusted. Therefore 14,100 scfm of combustion air per boiler is required at maximum heat input. The full exhaust flow rate volume from each Cementer of 11,000 cfm could not be completely vented to the boilers for control since boilers operate at different intervals than the Cementers and since clean combustion air is also necessary for proper boiler operation. For the sake of this analysis, we assumed a most conservative maximum capture efficiency for Cementer Exhaust to the Boilers of 85% and 95% VOC destruction efficiency (Overall control = 80.8%), and the cost of control for this configuration remains above $12,000 per ton of VOC emissions avoided. (See Appendix B).

Absorbers/wet scrubbers have not been determined effective and have not been installed for control of VOC emissions from manufacturing operations at tire plants. Although the VOC emissions are water soluble, this technology is not feasible for the BATO Warren plant because the exhaust flow required to capture emissions from milling, calendaring and extruding is extremely high. Absorbers are best suited to high concentration, low-flow applications for VOC control. Additionally, the plant does not have a way to treat the wastewater effluent that would result from the use of this technology since there is no wastewater treatment system onsite. Therefore, wet scrubber/absorption technology was not considered further.

As described previously, activated carbon adsorption becomes nearly useless when inlet concentration gets so low that the VOC will not be effectively adsorbed. No BACT determinations were found that include the use of carbon filtration to control emissions from rubber processing and manufacturing operations at tire manufacturing plants. Therefore, adsorption with activated carbon is considered not technically feasible.

An argument can be made that the highest VOC concentration from any of the rubber processing equipment including milling, extrusion, and calendaring is less than 20 ppm. At such a low concentration, none of the above listed add on control technologies are technically feasible. As described in EPA's Air Pollution Control Technology Fact Sheet for Thermal Incinerators, an inlet stream concentration of 1000 ppm VOC will be reduced to approximately 20 ppm when a 98% destruction efficiency is assumed. The extruders are not currently vented to any control devices due to negligible PM. However, it may be technically feasible to construct a hood to capture VOCs from extruders in order to control the 52.0 tons/year of VOC emissions generated by the extruders.

If we conservatively assumed that only 30,000 scfm of exhaust flow were needed to capture these emissions and vented to a single RTO, the estimated cost of avoided emissions would be greater than $8,000 per ton and therefore, economically infeasible. This analysis is included in Appendix B. The next highest contribution of VOC emissions from rubber processing equipment is 20.56 tons/year from calendaring and could also feasibly be vented to an RTO for control of VOC emissions though it is not currently. We assume this process would also require at least 30,000 scfm of exhaust flow to capture these emissions for venting to the RTO. Therefore, the same control cost would be applied with even less tons of avoided emissions and control is not economically feasible.

The above argument can certainly be applied to the remaining equipment in source 04 Manufacturing and Material Usage with no processes from these operations with a VOC concentration that is likely higher than 10-20 ppm. At such a low concentration, none of the above listed add on control technologies are technically feasible. The achievable emission reduction is approximately 20 ppm resulting from 98% reduction of an inlet stream of 1000 ppm per the EPA's Air Pollution Control Technology Fact Sheet.

For the 5 existing cement stations and 3 additional new cement stations, BATO evaluated RTOs for each station, a single RTO to control all 8 cement stations, a single RTO to control the 3 new cement stations, and a VOC concentrator in conjunction with an RTO to control the 3 new cement stations. Cost analyses for each configuration are included in Appendix B and show that the cost of avoided emissions are greater than $8,000 per ton of avoided emissions and are therefore, economically infeasible.

BATO has not identified acceptable alternative materials that may be used in the rubber compounds or as cement that can provide the same quality necessary for our products. Poor tire quality can result in unsafe tire construction.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Based on this analysis, there are no technically feasible and economically feasible add-on control technologies for VOC available for the Source 04 operations. Best work practices is the only remaining control option.

Step 5: Select BACT.

BATO proposes that BACT for VOC emissions from the milling, calendars, extruding, and cement stations is no control. Good work practices, such as storing VOC-containing materials in closed tanks or containers, use of low-VOC tire sprays and mold release products, cleaning up spills, and minimizing cleaning with VOC compounds should be implemented as BACT to control VOC emissions from all equipment associated with Source 04. BATO proposes an emission limit of 261.17 TPY as BACT for Source 04.

TIRE CURING Source 22

Step 1: Identify all control technologies.

The following are potentially available technologies for VOC emission controls for tire curing.

No.	Control Alternative	Control Alternative Category
1	Thermal Oxidizer, RTO, or multiple RTOs	Add-on control
2	Zeolite concentrators plus an RTO	Add-on control
3	Condenser Unit	Add-on control
4	Control with existing boiler	Add-on control
5	Absorption/Wet Scrubbing	Add-on control
6	Adsorption/Activated Carbon Tower	Add-on control
7	Best Work Practices	No Control (PP)

Step 2: Eliminate infeasible options.

The highest VOC concentration from the tire curing operations is likely less than 20.0 ppm. This is lower than the 20 ppmv threshold at which add-on controls are feasible. At such a low concentration, none of the above listed add on control technologies are technically feasible. As referenced above in the BACT analysis for Source 04 Manufacturing & Material Usage, the achievable emission reduction is approximately 20 ppm resulting from 98% reduction of an inlet stream of 1000 ppm. The most feasible option for add-on controls is a zeolite concentrator system of three concentrator wheels with a single RTO. BATO evaluated the cost to install two of these systems for control of VOC emissions captured over the 2 new curing bays. The cost was determined to be not economically feasible, and the analysis is provided in Appendix B.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Best work practices with no add-on controls is the only remaining control alternative, and we propose BACT for VOC emissions from tire curing to be best work practices.

Step 5: Select BACT.

As described above, BATO reviewed the RBLC, recent permits, and relevant industry standards. Based on the low concentration of VOC, BACT for VOC from tire curing operations is proposed to be good work practices with no add-on controls. These practices will include storing VOC-containing materials in closed tanks or containers, cleaning up spills, and minimizing cleaning with VOC compounds. BATO proposes an emission limit of 104.77 TPY as BACT for Source 22.

Table 2: Summary of Control Cost Analyses				
Emission Unit	**Control Configuration**	**VOC Emissions Avoided (tpy)**	**Annualized Control Cost ($)**	**Cost Effectiveness ($/ton)**
89-0077-04: Cement Stations	8 Stations: RTO for each Station	172.1	$3,738,220	$21,723
	8 Stations: One RTO No Concentrator	172.1	$3,203,927	$18,619
	3 New Stations: One RTO No Concentrator	64.5	$764,619	$11,849
	3 New Stations: Concentrator + One RTO	62.6	$799,211	$12,776
	3 New Stations: Concentrator + Boiler	62.6	$957,963	$15,314
	3 New Stations: Controlled in 3 Boilers	53.2	$791,357	$14,883
89-0077-04: Extruders	Extruders – Individual RTO	51.0	$685,174	$13,446
89-0077-05: Mixers 621, 622, 623, 624, 625, 626, 627, 328, and 329	Proportional Silane Use - RTOs on all 9 Mixers	16.7 (per mixer)	$685,174 (per mixer)	$40,987
	Proportional Silane Use - RTOs on pairs of Mixers (621&622; 623&624; 626&627; 328&329)	33.4 (per mixer pair)	$2,433,734 (per mixer pair)	$72,792
	Total Silane Used in 2 mixers – single RTO	138.5	$2,433,734	$17,572
	Concentrator & RTO system on 4 new mixers	64.8	$833,667	$12,861
	Concentrator & RTO system on 4 new mixers & 2 existing mixers	97.2	$1,188,241	$12,221
	2 New Mixers: Controlled in existing boilers	8.43	$341,740	$40,535
89-0077-22: Tire Curing	2 Concentrator & RTO systems for the new curing bay	33.2	$2,696,434	$81,277
	6 Concentrator & RTO systems for all curing bays	99.5	$8,809,303	$81,227

BACT Emergency Diesel Engines (89-0077-18 and -19)

- Good engine design
- Good combustion practices

All control technologies listed above are technically feasible. BATO selects BACT for the Source 18 and Source 19 Emergency Diesel Engines to be good engine design (certified to meet the requirements of NSPS Subpart IIII and NESHAP Subpart ZZZZ as applicable) and good combustion practices. The BACT emissions limits proposed for sources 18 and 19 are 0.062 TPY and 0.010 TPY respectively.

BACT Emergency Diesel Fire pumps (89-0077-20)

- Good engine design
- Good combustion practices

All control technologies listed above are technically feasible. BATO selects BACT for the Source 20 Emergency Diesel Fire pumps to be good engine design (certified to meet the requirements of NESHAP Subpart ZZZZ) and good combustion practices. BATO proposes an emission limit of 0.33 TPY as BACT for Source 20.

BACT Gasoline Storage Tank (89-0077-21)

- Good work practices

All control techniques listed above are technically feasible. The tank is just 300 gallons and is subject to 40 CFR Part 63 Subpart CCCCCC. The applicable standards are to maintain gasoline throughput to less than 10,000 gallons per month and comply with work practice standards. The work practice standards consist of minimizing vapor releases to the atmosphere by minimizing spills, cleaning spills immediately, cover all containers and tanks with a gasketed seal, and minimize waste. BATO will select the approved work practices for this tank described in the current permit as BACT. BATO proposes an emission limit of 0.048 TPY as BACT for Source 21.

BACT Insignificant Activities

If we assume that BACT has a threshold of economic feasibility of $8,000/ton of avoided emissions and is technically achievable for any of the listed insignificant activities. And if we assume that the control technology selected is able to achieve at least 98% control efficiency of VOC emissions. Then, the highest annual cost of control would be $2,352 for the Portable Diesel Air compressors and it would only remove 0.29 tons/year of VOC's. BATO is not aware of any VOC control technologies that are able to be operated for less than $2,500/year and applicable to the listed insignificant activities at the facility. BATO will continue to implement good and best industry practices to minimize VOC emissions from all insignificant activities at this facility. These practices are briefly described below for each of the insignificant activities with VOC emissions that will likely see some increased utilization.

Solvent Storage Tank: The solvent tank is sealed, and it is only vented when solvent is added to the tank. A venting hood carries the gases outside when it detects the tank is open. The vent is open to fill the tank approximately 8 times per month. The tank is indoors to prevent breathing losses from solar warming. These practices are considered BACT for this activity.

Tire Spraying (Dopers): Calculations for VOC Emissions from this activity are included in the Material Processing calculation and VOC Summary table. This Material is Inside Tire Spray Chem-Trend ML-3114 and has a low VOC Weight Fraction of 0.002 (*0.2%*). The SDS for this material is attached following the description of Insignificant Activities in the application. Use of Low-VOC materials is considered BACT for this activity.

Cement Spraying: VOC emissions from this activity are accounted for in the Cement Stations above for our BACT Analysis. PM emissions are less than 1 ton/year and are described in the Insignificant Activities section in the application. Refer to Source 04 BACT analysis above.

Tire Repair: For tire repairs, an average of 2% of tires require repairs, an average of 45 grams (less than 0.1 lbs) of rubber is removed, and 45 grams of rubber has to be cured onto the repair. The emission factor for rubber curing is 2.24 E-04 lb VOC per lb of rubber. The emission factor for rubber grinding is 1.59 E-02 lb VOC per lb of rubber removed. Assuming [redacted] – the VOC emissions from this activity are 0.080 Ton/year. BATO uses best industry practices to maintain Tire Repair emissions this low. These practices are considered BACT for this activity.

Final Inspection Marking: Typically, final inspection marking is completed with a dot matrix marking system utilizing the orange and yellow ink products shown in the Material Processing – Solvent Usage Table and VOC Summary in the permit application. These VOC emissions are accounted for in the BACT analysis above, and the minimum amount of ink is used to mark the tires for final inspection. In the description of Insignificant Activities in the application, we accounted for an additional volume of Spray Paint cans for Final Inspection marking. This activity is not typical, and only occurs if the Dot Matrix machine was not functional. Refer to Source 04 BACT Analysis above.

Oil Storage Tanks: BATO will add a new RM010 Tank, a new RS012 Tank, and a new WS019 Tank – all are specified to be the identical size and contents to the existing oil storage tanks. With these additional storage tanks, VOC emissions are estimated to increase from 0.030 TPY to 0.044 TPY. Emissions from storage tanks are kept to a minimum with good work practices, submerged filling, and light-colored tanks to prevent breathing losses from solar warming. These practices are considered BACT for the oil storage tanks.

Tire Testing Room: No VOC emissions are claimed from the Tire Testing Room activities, so this source is not included in the BACT analysis.
Two Electron Beam Generators (Precure machine): VOC emissions are included in the emission factors for Curing, and therefore, this activity is already accounted for above in our BACT Analysis for Source 22.

Mold Cleaning: No VOC emissions are claimed or expected from this activity and only particulate matter emissions are included in the description of Insignificant Activities in the application.

Tread Grinders: The BATO Warren Plant does not use Tread Grinders at this facility. This activity is no longer included in the description of Insignificant Activities in the permit application.

Inside Day Bins: Day Bins have bin vent filters for Particulate Matter emissions from carbon black and pigment transfers. No VOC emissions are claimed from this activity, so this source is not included in the BACT Analysis.

The remaining activities listed below, which are Categorical Insignificant Activities, are not expected to experience any increased utilization as part of this expansion. The emergency diesel engines, emergency diesel fire pumps, and gasoline storage tank are included separately above in the BACT Analysis. BATO uses best industry practices with submerged filling on fuel storage tanks; proper operation and maintenance on diesel air compressors, natural gas generator, and space heaters; best practices are in place to maintain and operate the water cooling towers. The best industry practices are in place for solvent management from the Parts Washers. No VOC emissions are expected from the PPE Vacuum Stations.

1.	Two 30,000 gallon #2 Fuel Oil Storage Tanks	TAPCR 1200-3-9-.04(5)(f)17
2.	300 gallon Diesel Tanks (2)	TAPCR 1200-3-9-.04(5)(f)17
3.	300 gallon Kerosene Tank	TAPCR 1200-3-9-.04(5)(f)17
4.	300 gallon Gasoline Tank	TAPCR 1200-3-9-.04(5)(f)17
5.	Portable Diesel Air Compressors	TAPCR 1200-3-9-.04(5)(f)37
6.	Standby Diesel Emergency Generator	TAPCR 1200-3-9-.04(5)(f)37
7.	Standby Natural Gas Generator	TAPCR 1200-3-9-.04(5)(f)37
8.	Diesel Powered Emergency Water Pumps	TAPCR 1200-3-9-.04(5)(f)37
9.	Two 550 gallon Diesel Tanks	TAPCR 1200-3-9-.04(5)(f)17
10.	Space Heaters	TAPCR 1200-3-9-.04(5)(f)14
11.	Water Cooling Towers	TAPCR 1200-3-9-.04(5)(f)15
12.	Parts Washer	TAPCR 1200-3-9-.04(5)(f)76
13.	Personal Protective Equipment Vacuum Stations	TAPCR 1200-3-9-.04(5)(f)94

Table 3: SUMMARY OF BACT ANALYSIS FOR VOC'S

Emission Source	VOC Emission Limit	Control Technology
Source 04 Manufacturing & Material Usage	261.17 tons/yr	Best work practices
Source 05 Material Handling and Mixer Charging	180.62 tons/yr	Best work practices
Source 10 Three Boilers & One Hydronic Heater	5.56 tons/yr	Use of clean fuels, good combustion practices, and efficient boiler design

Table 3: SUMMARY OF BACT ANALYSIS FOR VOC'S		
Emission Source	**VOC Emission Limit**	**Control Technology**
Source 18 Emergency Generator Engine (99 hp)	0.062 tons/yr	Good engine design and good combustion practices
Source 19 Emergency Generator Engine (15 hp)	0.010 tons/yr	Good engine design and good combustion practices
Source 20 Fire Pumps #1 and #2 (266 hp, each)	0.33 tons/yr	Good engine design and good combustion practices
Source 21 300 gallon Gasoline Tank	0.048 tons/yr	Good work practices to minimize vapor releases
Source 22 Tire Curing	104.77 tons/yr	Best work practices
Insignificant Activities (Highest VOC = Portable Diesel Air Compressors)	Total = 1.20 tons/yr Highest = 0.30 tons/yr	Best industry practices as described in Insignificant Activities section above

VI. AMBIENT AIR IMPACT ANALYSIS

In addition to the BACT analysis, a PSD application also must include an ambient air impact analysis to address the significant net emissions increases. VOC is a precursor for ozone, for which EPA has established a National Ambient Air Quality Standard (NAAQS). Accordingly, the ambient air impact analysis concentrates on ozone.

A. Ambient Air Monitoring

Several ozone monitoring stations are located across the state of Tennessee. These stations are representative of the ambient air in the vicinity of the facility.

B. Ozone Analysis

The ozone analysis uses a tiered approach based on the EPA's Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program (April 2019). In addition, Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the NSR and PSD Program was reviewed for further confirmation. The EPA's guidance establishes a stepwise approach as follows:

Step 1:

EPA has performed modeling analyses on numerous existing sources. The Modeled Emission Rates for Precursors (MERPs) listed in guidance represent the emission rates for which no significant impact on ambient ozone concentrations has been demonstrated. The first step is to identify representative hypothetical sources for the area. These are sources that have been modeled in the EPA study and are similar to this Project in type and geographical location. Since Morrison is located on the border of the Ohio Valley and Southeast geographical areas identified in the guidance, all of the sources in these areas were selected to represent the Project. This is a conservative approach.

Step 2:

The guidance refers to a spreadsheet that includes all of the results from the photochemical grid modeling performed for EPA and used in the analysis. The data from these sources are summarized in Table 4-1 (page 43) of the guidance and are used in Step 3. The table presents MERP values in each geographical area. The Tennessee guidance allows Tennessee PSD applications to use default MERP values of VOC = 1,542 tpy and NOx = 156 tpy without further justification (Giles, TN and Shelby, TN). As a conservative estimate, the lowest MERPs were selected for any source in the Ohio Valley or Southeast Areas (VOC = 1,159 tpy, NOx = 126 tpy). These emission levels represent the lowest emission rates that have not created a significant impact on ozone concentrations, based on the EPA modeling study. If the Project has emissions lower than the lowest emitting modelled source, which has proven not to cause a significant impact, then the Project will not cause a significant impact.

Step 3:

Using the Project emissions increases and the data from Step 2, the guidance suggests the following calculation:

$$\left(\frac{26.8\ tpy\ NOx\ from\ Source}{126\ tpy\ NOx, 8\ hr\ daily\ maximum\ O_3 MERP}\right) + \left(\frac{349.4\ tpy\ VOC\ from\ Source}{1{,}159\ tpy\ VOC, 8\ hr\ daily\ maximum\ O_3 MERP}\right)$$

$$= 0.21 + 0.30 = 0.51 \times 100 = 51\%$$

A value less than 100% indicates that the ozone significant impact level (SIL) would not be exceeded when considering the combined impacts of these precursors. Thus, the Project level ozone impacts associated with both NOx and VOC precursor emissions from this source are below the EPA recommended 8-hour ozone SIL. Consequently, a refined ambient ozone impact analysis (Tier 2) is not required.

C. Additional Impact Analysis

Growth Analysis

The purpose of the growth analysis is to (1) predict how much new growth associated with the proposed project is likely to result in secondary emissions and then (2) to estimate the emissions that will result from the associated growth.

The Project adds capability to produce more tires. The Project results in a modest increase in the number of employees at the plant. BATO plans to follow its normal practice of hiring from the existing workforce in the local area. No measurable impact on air quality is predicted from growth in local employment associated with this Project.

The Project also will result in a modest increase in transportation activities, primarily due to the flow of materials to the plant and shipment of tires from the plant. Carbon black will be mainly received via railcar. The remaining materials are received via truck transportation, on paved roadways. Shipments are also made via truck transportation on paved roadways. The modest increase in transportation activities will have negligible impact to ambient air quality.

Construction activities associated with the Project will be temporary. The construction activities to build the expansion necessary to contain the new units will principally consist of temporary placement of modular construction offices, routine building construction activities, and equipment installation. These activities will result in negligible impacts to ambient air quality.

Negligible additional emissions are associated with the anticipated modest growth as a result of the Project.

Secondary Impacts

The secondary NAAQS are intended to protect the public welfare from adverse effects of airborne effluents. This protection extends to agricultural soil.

Public Version - Trade Secret Information Redacted

The effects of gaseous air pollutants on vegetation may be classified into three rather broad categories: acute, chronic, and long-term. Acute effects are those that result from relatively short (less than 1 month) exposures to high concentrations of pollutants. Chronic effects occur when organisms are exposed for months or even years to certain threshold levels of pollutants. Long-term effects include abnormal changes in ecosystems and subtle physiological alterations in organisms. Acute and chronic effects are caused by the gaseous pollutant acting directly on the organism, whereas long-term effects may be indirectly caused by secondary agents such as changes in soil pH.

Using the MERPs Tier 1 demonstration, predicted ozone concentrations throughout the study area are well below the secondary NAAQS. Since the secondary NAAQS protect impact on human welfare, no significant adverse impact on soil, vegetation, endangered species, or visibility is anticipated due to the proposed modification.

D. Class I Assessment

To determine the impact on nearby Class I Areas, a Q/D calculation was performed as noted in Table 3. Since the Q/D is less than 10, Class I areas will not be impacted by the facility.

Table 4: Class I Area Q/D Calculation				
Plant-Wide Emissions			**Max lb/hr**	**TPY**
PM_{Total}			55.23	241.9
SO_2			39.03	170.9
NOx			81.77	358.1
H_2SO_4			1.16	5.1
			Total TPY:	**776.0**
Class I Areas Nearby			**Distance to Class I Area:**	
Mammoth Cave NP, KY			**163.9**	**km**
Great Smoky Mountains NP, TN			**172.3**	**km**
Joyce Kilmer-Slickrock Wilderness, NC			**170.2**	**km**
Cohutta Wilderness, GA			**134.4**	**km**
Sipsey Wilderness, AL			**197.4**	**km**
	Q (TPY)	**D (km)**	**Q/D**	**Q/D < 10?**
	776.0	134.4	5.77	**YES**

FLAG 2010:
"Therefore, the Agencies will consider a source locating greater than 50 km from a Class I area to have negligible impacts with respect to Class I AQRVs if its total SO_2, NOx, PM_{10}, and H_2SO_4 annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in km) from the Class I area (Q/D) is 10 or less. The Agencies would not request any further Class I AQRV impact analyses from such sources."

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX A

BASELINE ACTUAL EMISSIONS

ACTUAL MONTHLY THROUGHPUT DATA (2018 - 2019)
Bridgestone Americas Tire Operations, Inc.
Warren County Plant

Year	Month	Carbon Black (CB)	Clay	Pigment	Natural Gas (scf)	No. 2 Fuel Oil
2018	January	[redacted]				
2018	February	[redacted]				
2018	March	[redacted]				
2018	April	[redacted]				
2018	May	[redacted]				
2018	June	[redacted]				
2018	July					
2018	August					
2018	September					
2018	October					
2018	November					
2018	December					
2018	**TOTAL**	95,445,821.0	3,376,406.0	32,750,914.0	429,067,700.0	31,454.3
2019	January	[redacted]				
2019	February					
2019	March					
2019	April					
2019	May					
2019	June					
2019	July					
2019	August					
2019	September					
2019	October					
2019	November					
2019	December					
2019	**TOTAL**	92,665,769.0	3,168,872.0	32,958,448.0	477,608,100.0	0.0

	2018	2018	2018	2018	2018	2018	2018	2018
LOG 4 MATERIAL PROCESSING-MONTHLY LOG (89-0077-04)	January	February	March	April	May	June	July	August
	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed
Process	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.
Banburies								
Banbury Remill								
Wire Calender (4-Roll)								
Gum Calender (#3 and #4 Belt Cutter)								
Calender Profile (Profile/PREX)								
Innerliner Extruder (aka Rollerhead, PT Innerliner)								
All Purpose Extruders (#1, #3)								
Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)								
Wire Reinforcing Ext/Cal. (REX)								
Bead Filler (DSB)								
Bead Winder (HEX Winders)								
Rubber Mills (Refine Mill - Extrusion)								
TMA Stock Prep. (Rubber Used in Cement House)								
Tire Curing								
Silane Injection (mixing) (gallons) (RE067)								
Silane Injection (curing) (gallons) (RE067)								
Autoclave								
	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.
Solvent (RT018, Includes Cement)	[redacted]							
C264 Cement (70% solvent)	[redacted]							
Marking Ink Usage - White (D1858) - RQ858	[redacted]							
Orange Curable Jet Printer Ink D-3125 (RQ094/RQ611)	[redacted]							
Mold Spray ML-5401W - RU060	[redacted]							
Ink Jet Cleaner; L-420 (RX006)	[redacted]							
Black Repair Paint A-9387 (RQ515)	[redacted]							
Dot Matrix Yellow Ink D4936 (RQ109)	[redacted]							
Yellow Chlorobutyl Paint D-4361 (AB1153)	[redacted]							
Inside Tire Spray Chem-Trend ML-3055 (RY050)	[redacted]							
Inside Tire Spray Chem-Trend ML-2012 (RU020)	[redacted]							
Mold Release Chem-Trend ML-5419W (RU029)	[redacted]							
Mold Release Chem-Trend ML-8187 (RU187)	[redacted]							
Mold Release Chem-Trend ML-3068 (AB2036)	[redacted]							

	2018	2018	2018	2018	2019	2019	2019	2019
LOG 4 MATERIAL PROCESSING-MONTHLY LOG (89-0077-04)	September	October	November	December	January	February	March	April
	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed
Process	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.
Banburies								
Banbury Remill								
Wire Calender (4-Roll)								
Gum Calender (#3 and #4 Belt Cutter)								
Calender Profile (Profile/PREX)								
Innerliner Extruder (aka Rollerhead, PT Innerliner)								
All Purpose Extruders (#1, #3)								
Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)								
Wire Reinforcing Ext/Cal. (REX)								
Bead Filler (DSB)								
Bead Winder (HEX Winders)								
Rubber Mills (Refine Mill - Extrusion)								
TMA Stock Prep. (Rubber Used in Cement House)								
Tire Curing								
Silane Injection (mixing) (gallons) (RE067)								
Silane Injection (curing) (gallons) (RE067)								
Autoclave								
	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.
Solvent (RT018, Includes Cement)	[redacted]							
C264 Cement (70% solvent)	[redacted]							
Marking Ink Usage - White (D1858) - RQ858	[redacted]							
Orange Curable Jet Printer Ink D-3125 (RQ094/RQ611)	[redacted]							
Mold Spray ML-5401W - RU060	[redacted]							
Ink Jet Cleaner; L-420 (RX006)	[redacted]							
Black Repair Paint A-9387 (RQ515)	[redacted]							
Dot Matrix Yellow Ink D4936 (RQ109)	[redacted]							
Yellow Chlorobutyl Paint D-4361 (AB1153)	[redacted]							
Inside Tire Spray Chem-Trend ML-3055 (RY050)	[redacted]							
Inside Tire Spray Chem-Trend ML-2012 (RU020)	[redacted]							
Mold Release Chem-Trend ML-5419W (RU029)	[redacted]							
Mold Release Chem-Trend ML-8187 (RU187)	[redacted]							
Mold Release Chem-Trend ML-3068 (AB2036)	[redacted]							

	2019	2019	2019	2019	2019	2019	2019	2019
LOG 4 MATERIAL PROCESSING-MONTHLY LOG (89-0077-04)	May	June	July	August	September	October	November	December
	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed	*Material Processed
Process	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.	lb./mo.
Banburies								
Banbury Remill								
Wire Calender (4-Roll)								
Gum Calender (#3 and #4 Belt Cutter)								
Calender Profile (Profile/PREX)								
Innerliner Extruder (aka Rollerhead, PT Innerliner)								
All Purpose Extruders (#1, #3)								
Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)								
Wire Reinforcing Ext/Cal. (REX)								
Bead Filler (DSB)								
Bead Winder (HEX Winders)								
Rubber Mills (Refine Mill - Extrusion)								
TMA Stock Prep. (Rubber Used in Cement House)								
Tire Curing								
Silane Injection (mixing) (gallons) (RE067)								
Silane Injection (curing) (gallons) (RE067)								
Autoclave								
	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.	Usage gal/mo.
Solvent (RT018, Includes Cement)	[redacted]							
C264 Cement (70% solvent)								
Marking Ink Usage - White (D1858) - RQ858								
Orange Curable Jet Printer Ink D-3125 (RQ094/RQ611)								
Mold Spray ML-5401W - RU060								
Ink Jet Cleaner; L-420 (RX006)								
Black Repair Paint A-9387 (RQ515)								
Dot Matrix Yellow Ink D4936 (RQ109)								
Yellow Chlorobutyl Paint D-4361 (AB1153)								
Inside Tire Spray Chem-Trend ML-3055 (RY050)								
Inside Tire Spray Chem-Trend ML-2012 (RU020)								
Mold Release Chem-Trend ML-5419W (RU029)								
Mold Release Chem-Trend ML-8187 (RU187)								
Mold Release Chem-Trend ML-3068 (AB2036)								

ACTUAL PM EMISSIONS (2018 - 2019)
Bridgestone Americas Tire Operations, Inc.
Warren County Plant

[redacted]

[redacted] [redacted] [redacted] [redacted]

[redacted]

Source	Point Number	Pollutant	Emission Factor (lb PM / lb Matl)	Material Handled Potential (lb/hr)	Material Handled 2018 (lb/yr)	Material Handled 2019 (lb/yr)	Material Handled (lb/yr)	PM_{Total} (a) (tpy)	PM_{10} (b) (tpy)	$PM_{2.5}$ (c) (tpy)
Railcar and Trailer Unloading, Storage, and Holding (89-0077-02)	CB-RRBH-001	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.03	0.03	0.01
	CB-RRBH-002	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.12	0.12	0.03
	CB-STEF-001 to CB-STEF-010	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.11	0.11	0.03
	CB-621V-001 to CB-621V-010 & CB-623V-001 to CB-623-V-010	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.14	0.14	0.03
	CLAY001	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.00	0.00	0.00
	B-DCEF-FP1	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.74	0.74	0.17
TOTAL			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	**1.14**	**1.14**	**0.26**
Rubber Mixing and Milling (89-0077-05)	B-DCEF-621-C	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.80	0.80	0.18
	B-DCEF-623-C	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.80	0.80	0.18
	B-DCEF-624-C	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.80	0.80	0.18
	B-DCEF-625-C	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.80	0.80	0.18
	B-DCEF-621-P	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.81	0.81	0.19
	B-DCEF-622-P	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.81	0.81	0.19
	B-DCEF-623-P	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.81	0.81	0.19
	B-DCEF-625CL	PM	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0.11	0.11	0.03
TOTAL								**5.73**	**5.73**	**1.32**

Bridgestone Americas Tire Operations, LLC
Warren Plant
Actual Emissions (2018-2019)

Emission Source: 10
Two Babcock & Wilcox Boilers (75 MMBtu/hr, each)
One Hitachi Hydronic Heater (10.3 MMBtu/hr)

Operating Parameters

Fuel Type	Natural Gas		No. 2 Fuel Oil	
Heat Content of Fuel	1,020	Btu/cf	140,000	Btu/gal
Fuel Consumption (2018)	429.1	MMcf/yr	31.5	1000 gal/yr
Fuel Consumption (2019)	477.6	MMcf/yr	0.0	1000 gal/yr
Fuel Consumption (Average)	453.34	MMcf/yr	15.7	1000 gal/yr

Emission Calculations

Emission Factors for Natural Gas Combustion [1,2,3]

Pollutant	lb/10^6 scf	lb/MMBtu-HHV	Source
Particulate Matter (PM_{Total})	7.6	0.0075	AP-42 Table 1.4-2
Nitrogen Oxides (NO_x)	50	0.0490	AP-42 Table 1.4-1
Carbon Monoxide	84	0.0824	AP-42 Table 1.4-1
Sulfur Dioxide (SO_2)	0.6	0.0006	AP-42 Table 1.4-2
VOC	5.5	0.0054	AP-42 Table 1.4-2
Carbon Dioxide (CO_2)	119,316	116.98	40 CFR 98, Table C-1
Methane (CH_4)	2.25	0.0022	40 CFR 98, Table C-2
Nitrous Oxide (N_2O)	0.22	0.0002	40 CFR 98, Table C-2
Lead (Pb)	0.0005	--	AP-42 Table 1.4-2

	Annual [5] ton/year
Particulate Matter (PM_{Total})	1.72
Nitrogen Oxides (NO_x)	11.33
Carbon Monoxide	19.04
Sulfur Dioxide (SO_2)	0.14
Combustion VOC	1.25
Carbon Dioxide (CO_2)	27,045
Methane (CH_4)	0.51
Nitrous Oxide (N_2O)	0.05
CO_2 Equivalent (CO_2eq)[7,8]	27,073
Lead (Pb)	0.00011

Emission Factors for No. 2 Fuel Oil Combustion [1,2,3]

	$lb/10^3$ gal	lb/MMBtu-HHV		
Particulate Matter (PM_{Total})	3.3	0.024	AP-42 Table 1.3-2	
Nitrogen Oxides (NO_x)	20	0.143	AP-42 Table 1.3-1	
Carbon Monoxide	5	0.036	AP-42 Table 1.3-1	
Sulfur Dioxide (SO_2)	21.3	0.152	AP-42 Table 1.3-1 (142S. S = Sulfur Content<	0.1500 %)
VOC	0.2	0.001	AP-42 Table 1.3-3	
Carbon Dioxide (CO_2)	22,827	163.05	40 CFR 98, Table C-1	
Methane (CH_4)	0.93	0.0066	40 CFR 98, Table C-2	
Nitrous Oxide (N_2O)	0.19	0.0013	40 CFR 98, Table C-2	
Lead (Pb)	1.3E-03	9.0E-06	AP-42 Table 1.3-10	

	Annual [4] **ton/year**
Particulate Matter (PM_{Total})	0.03
Nitrogen Oxides (NO_x)	0.16
Carbon Monoxide	0.04
Sulfur Dioxide (SO_2)	0.17
Combustion VOC	0.00
Carbon Dioxide (CO_2)	179.50
Methane (CH_4)	0.01
Nitrous Oxide (N_2O)	0.00
CO_2 Equivalent (CO_2eq)[7,8]	180.12
Lead (Pb)	9.91E-06

Summary of Emissions[5]

	Annual [4] **ton/year**
Particulate Matter (PM_{Total})	1.75
Particulate Matter (PM_{10})	1.75
Particulate Matter ($PM_{2.5}$)	1.75
Nitrogen Oxides (NO_x)	11.49
Carbon Monoxide	19.08
Sulfur Dioxide (SO_2)	0.30
Combustion VOC	1.25
Carbon Dioxide (CO_2)	27,225
Methane (CH_4)	0.52
Nitrous Oxide (N_2O)	0.05
CO_2 Equivalent (CO_2eq)[6,7]	27,253
Lead (Pb)	1.23E-04

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Sections 1.3 and 1.4, July 1998, Small Boilers < 100 MMBtu/hr

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from $lb/10^6$ scf to $kg/10^6\ m^3$, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020.

(3) Assume PM= $PM_{2.5}$, PM_{10}

(4) Annual Emissions (tpy) = Annual Fuel Usage (MMCF or 1000 gal) * Emission Factor (lb/MMCF or lb/1000 gal) / 2,000 (lb/ton)

(5) Summary of Emissions: Annual Emissions = Natural gas emissions + fuel oil emissions

(6) CO_2 Equivalent (CO_2eq) = CO_2 + [GWP_{CH4} * CH_4] + [GWP_{N2O} * N_2O]

(7) GWP_{CH4} = 25, GWP_{N2O} = 298; 40 CFR 98 Table A-1

LOG 5 & LOG 8 MATERIAL PROCESSING-MONTHLY LOG **(89-0077-04)**

Month/ Year	Actual tires/day	VOC Emissions RMA (Tons per Month)	VOC Emissions Solvent TPM	VOC Emissions (Tons per Month)	VOC Emissions RT018 TPM	VOC Emissions Silane TPM	VOC RMA Tons per 12 months	VOC Solvent Tons Per 12 Months	VOC Silane Tons Per 12 months	VOC (*) Emissions Tons Per 12 Months	HAPs Emissions (Tons per Month) (**)	NonVOC HAPs Tons per Month	HAPs(*) Emissions Tons Per 12 Months(**)
Jan-18	[redacted]	8.07	11.52	19.59	10.63	0.00	95.51	119.07	0.04	214.62	1.41	0.30	16.75
Feb-18	[redacted]	7.69	8.72	16.42	8.19	0.01	95.66	119.17	0.04	214.85	1.35	0.28	16.75
Mar-18	[redacted]	8.49	8.95	17.44	8.43	0.01	95.89	118.20	0.04	214.11	1.49	0.32	16.80
Apr-18	[redacted]	7.99	9.49	17.49	9.16	0.01	96.14	117.80	0.04	213.95	1.39	0.29	16.84
May-18	[redacted]	8.26	15.87	24.13	15.33	0.01	96.29	122.77	0.05	219.07	1.45	0.31	16.87
Jun-18	[redacted]	7.73	3.94	11.67	3.53	0.18	96.49	119.12	0.23	215.61	1.33	0.28	16.87
Jul-18	[redacted]	7.04	8.72	15.76	8.29	0.01	96.38	116.66	0.23	213.04	1.26	0.27	16.87
Aug-18	[redacted]	8.52	11.14	19.66	10.62	0.02	96.40	114.65	0.25	211.04	1.47	0.31	16.86
Sep-18	[redacted]	8.11	7.72	15.83	7.26	0.03	96.32	112.51	0.28	208.84	1.42	0.30	16.86
Oct-18	[redacted]	8.58	11.76	20.35	11.22	0.02	96.39	115.20	0.30	211.59	1.50	0.32	16.88
Nov-18	[redacted]	7.67	9.51	17.18	9.17	0.00	96.04	115.09	0.30	211.14	1.38	0.29	16.84
Dec-18	[redacted]	7.60	8.05	15.65	7.69	0.02	95.76	115.40	0.31	211.16	1.34	0.28	16.80
Jan-19	[redacted]	8.29	10.00	18.29	9.36	0.04	95.98	113.88	0.35	209.86	1.47	0.31	16.85
Feb-19	[redacted]	7.63	8.87	16.50	8.41	0.00	95.92	114.03	0.34	209.95	1.35	0.28	16.85
Mar-19	[redacted]	8.80	9.78	18.58	9.40	0.28	96.23	114.86	0.61	211.09	1.49	0.31	16.85
Apr-19	[redacted]	8.05	8.72	16.77	8.18	0.07	96.29	114.08	0.67	210.37	1.41	0.30	16.87
May-19	[redacted]	8.24	8.44	16.68	8.05	0.07	96.27	106.65	0.73	202.92	1.42	0.30	16.84
Jun-19	[redacted]	8.31	7.49	15.81	7.03	0.08	96.85	110.20	0.64	207.05	1.44	0.30	16.95
Jul-19	[redacted]	5.71	9.80	15.51	9.24	0.03	95.52	111.28	0.66	206.80	1.02	0.20	16.71
Aug-19	[redacted]	8.61	8.85	17.46	8.34	0.20	95.61	108.99	0.84	204.60	1.46	0.31	16.69
Sep-19	[redacted]	7.73	8.82	16.54	8.32	0.11	95.23	110.08	0.92	205.32	1.36	0.29	16.64
Oct-19	[redacted]	8.57	11.30	19.87	10.92	0.17	95.22	109.62	1.08	204.84	1.46	0.31	16.60
Nov-19	[redacted]	7.75	7.30	15.04	6.78	0.16	95.29	107.41	1.24	202.70	1.35	0.28	16.58
Dec-19	[redacted]	6.95	7.22	14.17	6.99	0.11	94.64	106.58	1.33	201.22	1.23	0.25	16.46

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX B

BACT COST ANALYSIS

Warren County Expansion - BACT Info
Mixer - VOC Control of Baghouse Exhaust

	RTO Size - CFM	30,000 CFM	64,000 CFM
Annual cost of RTO		$685,174	$2,433,734

Total No. of Mixers
9

[redacted]

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse [redacted] = 30,000 scfm — Vent one mixer to a single RTO

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)orig		$612,100	Durr Estimate in 8.9.2019 Email
Equipment Cost (EC)updated		$875,000	Durr Estimate updated in 01.09.2023 Email
Freight	0.05*EC	$43,750	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$26,250	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$87,500	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$82,600	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Control Equipment Installed on new mixers
Total Direct Installation Costs (DC) =		$309,750	
Indirect Installation Costs			
Engineering	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075	
Total Installed Cost (PEC + DC + IC) =		$1,662,325	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,691,964**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	39 kW for fan	$14,560	Elec. Cost= $0.0425 0.0425 $/kWh Warren Co T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$182,313	Fuel use 33,974 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C — C = operating labor + maintenance costs
Administration		$23,850	2% TCC
Property Taxes		$11,925	1% TCC
Insurance		$11,925	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$240,897.56	
Total Annual Cost		**$685,174**	

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 30,000 scfm based on controlling a single Mixer in August 2019.
They additionally provided a second budgetary cost estimate for an individual RTO rated for 30,000 scfm to control a single Mixer in January 2023.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Public Version - Trade Secret Information Redacted

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse [redacted] x 2 = 64,000 scfm — Vent two mixers to a single RTO

		Cost		Cost Factor/Comments
Direct Costs		**Cost**		**Cost Factor/Comments**
Purchased Equipment Costs				
Equipment Cost (EC)orig		$2,240,000	2002 Dollars	Reference 1 - Minimum of the EPA Clean Air Technology Center Fact Sheet for Regenerative Oxidizers. (fact sheet presents a capital cost range of $35-140/scfm; we conservatively applied the minimum to estimate the capital cost of a standalone RTO.
Equipment Cost (EC)scaled		$4,714,792	2022 Dollars	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index CE Index in 2022 = 821.3 CE Index in 2002 = 390.2
Freight	$0.05*EC_b$	$235,740		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$141,444		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$471,479		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$5,563,455		
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$445,076.40		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$778,884		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$222,538.20		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$111,269		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor = 0%		$0		Control Equipment Installed on new mixers factor of up to 50% is appropriate - so this is conservative to assume $0
	Total Direct Installation Costs (DC) =	$1,669,037		
Indirect Installation Costs				
Engineering	0.10*PEC	$556,346		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$278,173		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$556,346		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$111,269		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$55,635		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$166,904		Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$1,724,671		
	Total Installed Cost (PEC + DC + IC) =	$8,957,163		
Ductwork	1000 feet	$987,956		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$9,945,118**		

		Cost	Cost Factor/Comments		
Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	83 kW for fan	$31,061	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$389,203	Fuel use	72,477	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$198,902	2% TCC		
Property Taxes		$99,451	1% TCC		
Insurance		$99,451	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$1,415,961.09			
Total Annual Cost		**$2,433,734**			

Basis:
1) EPA's RTO Fact Sheet for oxidizers, *www.epa.gov/catc/clean-air-technology-center-products#factsheets* , states capital cost range of an RTO is $35-140/scfm, minimum of range selected.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for All 4 new Mixers = 126,636 scfm

		Cost	Cost Factor/Comments
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000
Scaled RTO Equipment Cost (EC_b)		$1,367,669	Scaled (Larger RTO cost * (Smaller RTO flowrate/Larger RTO Flowrate)
Freight	$0.05*EC_b$	$68,383	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$41,030	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$136,767	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$1,613,849	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$129,107.93	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$225,939	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$64,553.97	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$32,277	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$484,155	
Indirect Installation Costs			
Engineering	0.10*PEC	$161,385	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$80,692	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$161,385	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$32,277	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$16,138	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$48,415	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$500,293	
	Total Installed Cost (PEC + DC + IC) =	$2,598,297	
Ductwork	120 feet	$118,555	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$2,716,852**	

		Cost	Cost Factor/Comments		
Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	165 kW for fan	$61,459	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$77,011	Fuel use	14,341	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$54,337	2% TCC		
Property Taxes		$27,169	1% TCC		
Insurance		$27,169	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$386,818.58			
Total Annual Cost		**$833,667**			
Rubber VOC and EtOH from Silane at 4 new Mixers (tpy)		**80.27**	Control Device Capture Efficiency = 85%		Control Efficiency = 95%
Controlled VOC Emissions from 4 new Mixers (tpy)		**15.45**			
VOC Emissions Avoided (tpy)		**64.82**			
BACT Cost ($/Ton of VOC Emissions Avoided)		**$12,861**			

Basis:

1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. For a smaller unit that will be used to control 4 mixers, a ratio of the exhaust flowrates with no scaling factor was used to scale the cost. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for All 4 new Mixers and 2 existing mixers = 189,954 scfm

Item	Factor	Cost	Cost Factor/Comments
Direct Costs			
Purchased Equipment Costs			
Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000 for a system with three concentrator wheels with one common RTO.
Freight	0.05*EC_b	$108,000	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC_b	$64,800	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC_b	$216,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$2,548,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$203,904.00	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$356,832	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$101,952.00	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$50,976	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$764,640	
Indirect Installation Costs			
Engineering	0.10*PEC	$254,880	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$127,440	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$254,880	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$50,976	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$25,488	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$76,464	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$790,128	
	Total Installed Cost (PEC + DC + IC) =	$4,103,568	
Ductwork	180 feet	$177,832	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$4,281,400**	

Item	Basis	Cost	Cost Factor/Comments		
Direct Annual costs					
Electricity Cost	248 kW for fan	$92,189	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$115,517	Fuel use	21,511	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$85,628	2% TCC		
Property Taxes		$42,814	1% TCC		
Insurance		$42,814	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$609,575.04			
Total Annual Cost		**$1,188,241**			
Rubber VOC and EtOH from Silane at 4 new Mixers + 2 existing Mixers (tpy)		**120.41**	Control Device Capture Efficiency =	85%	Control Efficiency = 95%
Controlled VOC Emissions from 4 new Mixers + 2 existing Mixers (tpy)		**23.18**			
VOC Emissions Avoided (tpy)		**97.23**			
BACT Cost ($/Ton of VOC Emissions Avoided)		**$12,221**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. It is assumed that a similarly sized unit would be able to control the exhaust volume from 6 Mixers (4 New Mixers and 2 Existing Mixers) totaling nearly 200,000 cfm. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR MIXING - BOILER CONTROL
BRIDGESTONE WARREN CO

Air flow rate for Mixer =	31,659 scfm		Vent a single Mixer to a boiler for control.
Total Air flow rate able to be vented for 2 Mixers =	14,000 scfm		Vent 2 separte streams from Mixers to existing boilers for control.

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$10,000	Min. Cost associated with the installation of a booster fan. (Reference 1)
Freight	0.05*EC	$500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$300	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$1,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$11,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$944	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$1,652	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$472	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$3,540	
Indirect Installation Costs			
Engineering	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$590	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$354	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$3,658	
	Total Installed Cost (PEC + DC + IC) =	$18,998	
Ductwork	1780 feet	$1,758,561	Chris Buchanan on 6.07.2023.(BATO Engineering Div. Manager) & Reference 2 Scaled
Total Capital Cost (TCC)	TCC =	**$1,777,559**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	41 kW for fan	$15,365	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$0	Fuel use	0	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/month	$400			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$60	15% of operating labor, Reference 3		
Maintenance	1 hr/month	$454			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$454	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$820.70	0.6 * C		C = operating labor + maintenance costs
Administration		$35,551	2% TCC		
Property Taxes		$17,776	1% TCC		
Insurance		$17,776	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$253,084.40			
Total Annual Cost		**$341,740**			
Rubber VOC and EtOH from Silane at 2 new Mixers (tpy)		**40.14**	Control Device Capture Efficiency =	22%	Control Efficiency = 95%
Controlled VOC Emissions from 2 new Mixers (tpy)		**31.71**			
VOC Emissions Avoided (tpy)		**8.43**			
BACT Cost ($/Ton of VOC Emissions Avoided)		**$40,535**			

Basis:
1) Engineering Judgement used to estimate cost of booster fan.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR EXTRUDING
BRIDGESTONE WARREN CO

Air flow rate for Extruding (minimum) =	30,000 scfm		Vent Extruders to a single RTO
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)orig		$612,100	Durr Estimate in 8.9.2019 Email
Equipment Cost (EC)updated		$875,000	Durr Estimate updated in 01.09.2023 Email
Freight	0.05*EC	$43,750	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$26,250	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$87,500	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$82,600	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Control Equipment Installed on new mixers
Total Direct Installation Costs (DC) =		$309,750	
Indirect Installation Costs			
Engineering	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075	
Total Installed Cost (PEC + DC + IC) =		$1,662,325	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,691,964**	
Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	39 kW for fan	$14,560	Elec. Cost= $0.0425 0.0425 $/kWh Warren Co T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$182,313	Fuel use 33,974 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C C = operating labor + maintenance costs
Administration		$23,850	2% TCC
Property Taxes		$11,925	1% TCC
Insurance		$11,925	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$240,897.56	
Total Annual Cost		**$685,174**	
Total VOC Emissions avoided = Total Emissions * 98% Dest. Efficiency			**50.96 Tons VOC Avoided**
Economic Feasibility $/ton avoided.			**$13,446**

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 30,000 scfm based on controlling a single Mixer in August 2019.
They additionally provided a second budgetary cost estimate for an individual RTO rated for 30,000 scfm to control a single Mixer in January 2023. We applied the same cost for control of extruders.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Summary - Cement Station Control Cost Analysis

[redacted]

Public Version - Trade Secret Information Redacted

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 11,000 scfm — Vent a single new cement station to an RTO for control.

Direct Costs	Factor	Cost		Cost Factor/Comments
Purchased Equipment Costs				
Equipment Cost (EC_a)		$360,000	2019 Dollars	Durr Estimate in 11.08.2019 Email - Reference 1
Equipment Cost (EC_b)		$490,980	2022 Dollars	Durr Estimate in 11.08.2019 Email - (Scaled to 2022) 602.2 is the 2019 (August) CE Plant Cost Index 821.3 is the 2022 (September) CE Plant Cost Index
Freight	$0.05*EC_b$	$24,549		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$14,729		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$49,098		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$579,356		
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$46,348.49		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$81,110		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$23,174.24		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$11,587		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor		$0		Install on new cement stations
	Total Direct Installation Costs (DC) =	$173,807		
Indirect Installation Costs				
Engineering	0.10*PEC	$57,936		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$28,968		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$57,936		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$11,587		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$5,794		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$17,381		Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$179,600		
	Total Installed Cost (PEC + DC + IC) =	$932,763		
Ductwork	140 feet	$138,314		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,071,077**		

Direct Annual costs		Cost	Cost Factor/Comments		
Electricity Cost	14 kW for fan	$5,339	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$66,894	Fuel use	12,457	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$21,422	2% TCC		
Property Taxes		$10,711	1% TCC		
Insurance		$10,711	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$152,497.28			
Total Annual Cost		**$467,278**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 11,000 scfm based on controlling a single cement station in November 2019.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Public Version - Trade Secret Information Redacted

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 88,000 scfm — Vent [redacted] cement stations to a single RTO for control.

		Cost		Cost Factor/Comments
Direct Costs				
Purchased Equipment Costs				
Equipment Cost (EC)orig		$3,080,000	2002 Dollars	Reference 1 - Minimum of the EPA Clean Air Technology Center Fact Sheet for Regenerative Oxidizers. (fact sheet presents a capital cost range of $35-140/scfm; we conservatively applied the minimum to estimate the capital cost of a standalone RTO.
Equipment Cost (EC)scaled		$6,482,840	2022 Dollars	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index CE Index in 2022 = 821.3 CE Index in 2002 = 390.2
Freight	$0.05*EC_b$	$324,142		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$194,485		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$648,284		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$7,649,751		
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$611,980.06		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$1,070,965		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$305,990.03		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$152,995		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$76,498		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$76,498		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor = 0%		$0		Install on existing cement stations. Per EPA Cost Manual a retrofit factor of up to 50% is appropriate - so this is conservative to assume $0
Total Direct Installation Costs (DC) =		$2,294,925		
Indirect Installation Costs				
Engineering	0.10*PEC	$764,975		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$382,488		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$764,975		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$152,995		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$76,498		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$229,493		Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$2,371,423		
Total Installed Cost (PEC + DC + IC) =		$12,316,099		
Ductwork	1000 feet	$987,956		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$13,304,054**		

Direct Annual costs		Cost	**Cost Factor/Comments**		
Electricity Cost	115 kW for fan	$42,708	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$535,154	Fuel use	99,656	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance Labor $	1 hr/shift 37.84 /hr	$41,435	T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$266,081	2% TCC		
Property Taxes		$133,041	1% TCC		
Insurance		$133,041	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$1,894,198.01			
Total Annual Cost		**$3,203,927**			

Basis:

1) EPA's RTO Fact Sheet for oxidizers, *www.epa.gov/catc/clean-air-technology-center-products#factsheets* , states capital cost range of an RTO is $35-140/scfm, minimum of range selected.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 33,000 scfm — Vent [redacted] cement stations to a single RTO for control.

Direct Costs		**Cost**		**Cost Factor/Comments**
Purchased Equipment Costs				
Equipment Cost (EC)orig		$1,155,000	2002 Dollars	Reference 1 - Minimum of the EPA Clean Air Technology Center Fact Sheet for Regenerative Oxidizers. (fact sheet presents a capital cost range of $35-140/scfm; we conservatively applied the minimum to estimate the capital cost of a standalone RTO.
Equipment Cost (EC)scaled		$2,431,065	2022 Dollars	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index CE Index in 2022 = 821.3 CE Index in 2002 = 390.2
Most Conservative Updated Low estimate of Equipment Cost (EC_c)		$875,000	2023 Dollars	Durr Estimated cost of RTO for a single Mixer at approx. 30,000 cfm updated in 01.09.2023 Email
Freight	$0.05*EC_c$	$43,750		Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_c$	$26,250		Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_c$	$87,500		Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$1,032,500		=sum of most conservative EC + Freight + Taxes + Instrumentation
Direct Installation Costs				
Foundations and Supports	0.08*PEC	$82,600.00		Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550		Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300.00		Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650		Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown		(unknown at this time)
Retrofit Factor = 0%		$0		Install on existing cement stations. Per EPA Cost Manual a retrofit factor of up to 50% is appropriate - so this is conservative to assume $0
	Total Direct Installation Costs (DC) =	$309,750		
Indirect Installation Costs				
Engineering	0.10*PEC	$103,250		Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625		Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250		Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650		Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325		Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975		Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$320,075		
	Total Installed Cost (PEC + DC + IC) =	$1,662,325		
Ductwork	250 feet	$246,989		Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,909,314**		

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	43 kW for fan	$16,016	Elec. Cost= $0.0425 — 0.0425 $/kWh Warren Co 2022 cost, T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$200,683	Fuel use 37,371 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C — C = operating labor + maintenance costs
Administration		$38,186	2% TCC
Property Taxes		$19,093	1% TCC
Insurance		$19,093	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$271,843.34	
Total Annual Cost		**$764,619**	

Basis:

1) EPA's RTO Fact Sheet for oxidizers, *www.epa.gov/catc/clean-air-technology-center-products#factsheets*, states capital cost range of an RTO is $35-140/scfm, minimum of range selected.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for [redacted] Cement Stations =	33,000 scfm		Vent [redacted] cement stations to a single concentrator and a single RTO for control.
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$950,000	Durr Estimate in 11.12.2019 Email
Freight	0.05*EC	$47,500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$28,500	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$95,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$1,121,000	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$89,680.00	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$156,940	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$44,840.00	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$22,420	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$336,300	
Indirect Installation Costs			
Engineering	0.10*PEC	$112,100	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$56,050	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$112,100	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$22,420	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$11,210	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$33,630	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$347,510	
	Total Installed Cost (PEC + DC + IC) =	$1,804,810	
Ductwork	30 feet	$29,639	Minimum estimate of require ductwork. Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$1,834,449**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	65 kW for fan	$24,023	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$20,068	Fuel use	3,737	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Ref 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$36,689	2% TCC		
Property Taxes		$18,344	1% TCC		
Insurance		$18,344	1% TCC		
Zeolite Replacement (Once):					
Zeolite Replacement Material Cost	4 rotor	$219,696	By Durr $200,000 per rotor + $15,000 freight, scaled from original estimate		
Zeolite Replacement Labor Cost			Unknown		
Zeolite Disposal Cost	4 rotor	$1,167	Assumed equal to Aiken PSR waste Disposal Cost is $0.19/lb		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$261,184.22			
Total Annual Cost		**$799,221**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for a disc concentrator system and single RTO rated for 33,000 scfm based on controlling three cement stations in November 2019.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR CEMENTING
BRIDGESTONE WARREN CO

Air flow rate for Cement Station = 33,000 scfm — Vent[redacted]cement stations to a single concentrator and to a boiler for control.

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$775,186	2019 Cost Estimate beased on budgetary data from Durr Systems Inc.
Freight	0.05*EC	$38,759	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$23,256	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$77,519	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$914,720	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$73,178	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$128,061	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$36,589	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$18,294	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$274,416	
Indirect Installation Costs			
Engineering	0.10*PEC	$91,472	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$45,736	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$91,472	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$18,294	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$9,147	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$27,442	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$283,563	
	Total Installed Cost (PEC + DC + IC) =	$1,472,699	
Ductwork			Based on venting emissions from cementer to existing boiler.
	1403 feet	$1,386,102	Reference 2, scaled

Chris Buchanan (BATO Engineering Div. Manager) email 6.07.2023 indicates a minimum distance between Cementing and Boilers of 1,403 feet

Total Capital Cost (TCC)	TCC =	**$2,858,801**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	43 kW for fan	$16,016	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$0	Fuel use	0	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$57,176	2% TCC		
Property Taxes		$28,588	1% TCC		
Insurance		$28,588	1% TCC		
Zeolite Replacement (Once):					
Zeolite Replacement Material Cost	4 rotor	$219,696	By Durr $200,000 per rotor + $15,000 freight, scaled from original estimate		
Zeolite Replacement Labor Cost			Unknown		
Zeolite Disposal Cost	4 rotor	$1,167	Assumed equal to Aiken PSR waste Disposal Cost is $0.19/lb		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$407,028.91			
Total Annual Cost		**$957,963**			

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an integrated Concentrator + RTO system rated for 33,000 scfm to control three (3) cement stations ($950,000). This estimate was scaled and reduced to remove the cost of the RTO in the system.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

CONTROL COSTS FOR CEMENTING - BOILER CONTROL
BRIDGESTONE WARREN CO

Air flow rate for Cement Station =	11,000 scfm		Vent a single cement station to a boiler for control.
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)		$10,000	Min. Cost associated with the installation of a booster fan. (Reference 1)
Freight	0.05*EC	$500	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$300	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$1,000	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$11,800	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$944	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$1,652	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$472	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$3,540	
Indirect Installation Costs			
Engineering	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$590	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$1,180	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$236	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$118	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$354	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$3,658	
	Total Installed Cost (PEC + DC + IC) =	$18,998	
Ductwork			Based on venting emissions from cementer to existing boiler.
	1403 feet	$1,386,102	Reference 2, scaled

Chris Buchanan (BATO Engineering Div. Manager) email 6.07.2023 indicates a minimum distance between Cementing and Boilers of 1,403 feet

Total Capital Cost (TCC)	TCC =	**$1,405,100**			
Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	14 kW for fan	$5,339	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$0	Fuel use	0	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/month	$400			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$60	15% of operating labor, Reference 3		
Maintenance	1 hr/month	$454			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$454	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$820.70	0.6 * C		C = operating labor + maintenance costs
Administration		$28,102	2% TCC		
Property Taxes		$14,051	1% TCC		
Insurance		$14,051	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$200,054.58			
Total Annual Cost		**$263,786**			

Basis:
1) Engineering Judgement used to estimate cost of booster fan.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Curing VOC Control Analysis (Analyzing New Curing Bays Only for BACT Economic Feasibility)

[redacted]

$/ton avoided emissions	$81,277

Curing VOC Control Analysis (Analyzing control of All Curing Bays for BACT Economic Feasibility)

[redacted]

$/ton avoided emissions	$81,277

Public Version - Trade Secret Information Redacted

CONCENTRATOR/REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR CURING
BRIDGESTONE WARREN CO

Air flow rate for Curing Press Bay = 254,500 scfm

Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Quoted RTO Equipment Cost (EC_a)		$2,160,000	Durr Estimate in 9.17.2019 Email for 200,000 flow rate = $2,160,000
Scaled RTO Equipment Cost (EC_b)		$2,496,022	Scaled (Smaller RTO cost * (Larger RTO flowrate/Smaller RTO Flowrate)^0.6
Freight	$0.05*EC_b$	$124,801	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	$0.03*EC_b$	$74,881	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	$0.10*EC_b$	$249,602	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
	Total Purchased Equipment Costs (PEC) =	$2,945,306	
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$235,624.49	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$412,343	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$117,812.24	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$58,906	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Install on new mixers
	Total Direct Installation Costs (DC) =	$883,592	
Indirect Installation Costs			
Engineering	0.10*PEC	$294,531	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$147,265	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$294,531	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$58,906	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$29,453	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$88,359	Table 2.8 of the OAQPS Control Cost manual
	Total indirect Installation Costs (IC) =	$913,045	
	Total Installed Cost (PEC + DC + IC) =	$4,741,943	
Ductwork	30 feet	$29,639	Based on new control device west of mixing building Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$4,771,581**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	332 kW for fan	$123,515	Elec. Cost= $0.0425 — 0.0425 $/kWh Warren Co 2022 cost, T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$154,769	Fuel use 28,821 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift, $ 33.31 /hr	$36,474	T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance Labor	1 hr/shift, $ 37.84 /hr	$41,435	T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C — C = operating labor + maintenance costs
Administration		$95,432	2% TCC
Property Taxes		$47,716	1% TCC
Insurance		$47,716	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$679,365.85	
Total Annual Cost		**$1,348,217**	

Basis:

1) Durr Systems Inc. provided a budgetary cost estimate for an integrated system of three concentrator wheels vented to one common RTO for Curing Bays with a total exhaust volume of 200,000 cfm (estimated - $2,160,000) in September 2019. A commonly accepted approach for scaling equipment cost is to use a ratio of the equipment size with a scaling factor of 0.6. The difference in costs from 2019 to 2022 dollars did not warrant consideration based on the high cost of control and low total of avoided emissions from Curing.

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

Bridgestone Americas Tire Operations, LLC
Warren Plant

Best Available Control Technology Analysis

$ 8,000 = Assumed BACT Threshold ($/ton)
98% = Assumed Maximum Control Efficiency

Emission Source	Source Description	Max VOC Emissions (tpy)	VOC Emissions Avoided (tpy)	Control Cost ($/yr)
Insignificant Activities				
B1	Learning Center and Employee Services Boilers/Heaters	4.10E-02	4.02E-02	$321
B2	Solvent Storage Tank	0.12	0.12	$941
B6	Final Inspection Marking	0.13	0.12	$980
B7	Hot Knife Cutting	0.00	0.00	$0
B8	Ultrasonic Knife	0.00	0.00	$0
B9	Oil Storage Tanks	4.40E-02	4.31E-02	$345
B10	Tire Testing Room	0.00	0.00	$0
B11	Electron Beam Generator (Precure Machine)	0.00	0.00	$0
B12	Mold Cleaning	0.00	0.00	$0
B13	Tread Grinders	4.66E-02	4.57E-02	$365
B14	Inside Day Bins	0.00	0.00	$0
C1	Two 30,000 gallon #2 Fuel Oil Storage Tanks	4.00E-02	3.92E-02	$314
C2	300 gallon Diesel Tanks (2)	1.00E-04	9.80E-05	$1
C3	300 gallon Kerosene Tank	1.00E-04	9.80E-05	$1
C5	Portable Diesel Air Compressors	0.30	0.29	$2,352
C7	Standby Natural Gas Emergency Generator	2.80E-03	2.74E-03	$22
C9	Two 550 gallon Diesel Tanks	3.00E-04	2.94E-04	$2
C10	Space Heaters	8.74E-02	8.57E-02	$685
C11	Water Cooling Towers	0.16	0.15	$1,233
C12	Parts Washers	0.20	0.20	$1,568
C13	Personal Protective Equipment Vacuum Stations	0.00	0.00	$0
D1	Electric Driven Air Compressors	0.00	0.00	$0
D2	Boiler Water Treatment System	Not known	--	--
D3	Steam Condensate Relief Valves	0.00	0.00	$0
D4	QA Laboratory	0.00	0.00	$0
D5	Maintenance Activities	Not known	--	--
D6	Banbury Lab	0.00	0.00	$0
D7	Battery Charging Stations	0.00	0.00	$0
D8	Welding Operations	Not known	--	--
D9	Sewer Vents	0.00	0.00	$0
D10	Natural Gas Pressure Regulator Vents	0.00	0.00	$0

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX C

DISCUSSION OF CAPTURE EFFICIENCY FOR VOC EMISSIONS FROM RUBBER MIXERS

Capture Efficiency for VOC Emissions from Rubber Mixer

Rubber mixing is a batch process that is operated on a continual basis to make stock rubber. The mixer has an upper charge door and a lower batch out door. To start the mixing process, the upper door is opened while carbon black and pigments are charged to the mixer. Both of these materials contain fine particles and create dust during charging. Baghouses are used to control dust generated from charging these materials. For [redacted] mixer, the size of these baghouses are often on the order of 30,000 cfm and they provide good capture of dust and gases. During mixing, both upper and lower doors are closed and the mixer is sealed. Once mixing is complete, the lower batch out door is opened to drop the batch of rubber onto a mill, that creates a continuous sheet of stock rubber that goes to the festoon. When the batch out door opens, a small amount of gases and VOC are released from the mixer. The mixer is hot, more than 200 °F , and most of the gases stay in the mixer due to buoyant forces. Capture of gases at batch out is difficult, because the configuration of the batch out door and mill. On the order of 50,000 cfm is required to capture a portion of these gases on [redacted] mixer. Once the batch is dropped, the mixer begins a new cycle of mixing. The batch out door closes and the charge door opens to accept charge materials. At this point, most of the hot gases and VOC are released through the charge door. These gases are mostly captured and routed through the mixer baghouse.

Charge Door Capture Efficiency

The charge door is a small door that can be effectively hooded to achieve high capture efficiency. Essentially all of the particulate emissions from the mixer occur at this location, so capture of particulate emissions is very good. Due to the temperature and buoyant forces in the mixer, most of the VOC created during mixing is also exhausted through the charge door. For the same reasons as particulate, capture of the VOC is very high.

Batch Out Door Capture Efficiency

At batch out, essentially no particulate and a small portion of the VOC generated during mixing are released. The configuration of the batch out door and mill must be open for production, and cannot be effectively hooded. A large amount of air is required to collect the VOC and other gases. With large air flow and a small amount of gases, the resulting air stream is very dilute. This air stream is usually exhausted to atmosphere without control.

Summary

Collection of VOC mainly occurs at the charge door and only in part at the batch out door. Mixing is a batch operation that occurs on a continuous basis to feed the batch out mill. For most of the batch, the mixer is sealed. VOC is only released during short periods of time when the charge door or batch out door is open. Based upon this information, an approximate calculation of the overall VOC can be made as follows:

Charge Door Capture – 95%
Portion of VOC released through charge door – 90%
Batch Out Door Capture – 0% (since there is typically no control device)
Portion of VOC released through batch out door – 10%

85% capture of VOC (to a control device) = (95%)(90%) + (0%)(10%)

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX D

APPLICATION FORMS AND CALCULATIONS

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC Index

TITLE V PERMIT APPLICATION
INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS

Section 1: Identification and Diagrams	
This application contains the following forms:	APC Form 1, Facility Identification 1
	APC Form 2, Operations and Flow Diagrams 1

Section 2: Emission Source Description Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 3, Stack Identification	23
	APC Form 4, Fuel Burning Non-Process Equipment	1
	APC Form 5, Stationary Gas Turbines or Internal Combustion Engines	
	APC Form 6, Storage Tanks	
	APC Form 7, Incinerators	
	APC Form 8, Printing Operations	
	APC Form 9, Painting and Coating Operations	
	APC Form 10, Miscellaneous Processes	4
	APC Form 33, Stage I and Stage II Vapor Recovery Equipment	
	APC Form 34, Open Burning	

Section 3: Air Pollution Control System Forms		
		Total number of this form
This application contains the following forms (one form for each control system in use at the facility):	APC Form 11, Control Equipment - Miscellaneous	
	APC Form 13, Adsorbers	
	APC Form 14, Catalytic or Thermal Oxidation Equipment	
	APC Form 15, Cyclones/Settling Chambers	
	APC Form 17, Wet Collection Systems	
	APC Form 18, Baghouse/Fabric Filters	18

(OVER)

Section 4: Compliance Demonstration Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 19, Compliance Certification - Monitoring and Reporting - Description of Methods for Determining Compliance	5
	APC Form 20, Continuous Emissions Monitoring	
	APC Form 21, Portable Monitors	
	APC Form 22, Control System Parameters or Operating Parameters of a Process	
	APC Form 23, Monitoring Maintenance Procedures	2
	APC Form 24, Stack Testing	
	APC Form 25, Fuel Sampling and Analysis	1
	APC Form 26, Record Keeping	4
	APC Form 27, Other Methods	
	APC Form 28, Emissions from Process Emissions Sources / Fuel Burning Installations / Incinerators	5
	APC Form 29, Emissions Summary for the Facility or for the Source Contained in This Application	1
	APC Form 30, Current Emissions Requirements and Status	4
	APC Form 31, Compliance Plan and Compliance Certification	
	APC Form 32, Air Monitoring Network	

Section 5: Statement of Completeness and Certification of Compliance

I have reviewed this application in its entirety and to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I have provided all the information that is necessary for compliance purposes and this application consists of __________ pages and they are numbered from page 1____ to _____. The status of this facility's compliance with all applicable air pollution control requirements, including the enhanced monitoring and compliance certification requirements of the Federal Clean Air Act, is reported in this application along with the methods to be used for compliance demonstration.

Name and Title of Responsible Official	Telephone Number with Area Code
TIM PAINTER, Plant Manager	931-668-5500 x1000
Signature of Responsible Official	Date of Application
	6-21-23

(For definition of responsible official, see instructions for APC Form 1)

Public Version - Trade Secret Information Redacted

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 1

TITLE V PERMIT APPLICATION
FACILITY IDENTIFICATION

SITE INFORMATION			
1. Organization's legal name Bridgestone Americas Tire Operations, LLC		For APC Use Only	APC company point no.
2. Site name (if different from legal name) Warren Plant			APC Log/Permit no.
3. Site address (St./Rd./Hwy.) 725 Bridgestone Drive		NAICS or SIC Code NAICS 326211	
City or distance to nearest town Morrison	Zip code 37357	County name Warren	
4. Site location (in Lat./Long)	Latitude 35.625	Longitude -85.8792	

CONTACT INFORMATION (RESPONSIBLE OFFICIAL)			
5. Responsible official contact Tim Painter (Plant Manager)			Phone number with area code 931-668-5500, x1000
6. Mailing address (St./Rd./Hwy.) Same as site address			Fax number with area code (931) 668-5659
City	State	Zip code	Email address PainterTim@bfusa.com

CONTACT INFORMATION (TECHNICAL)			
7. Principal technical contact Terri Burnett (Sr. Environmental Engineer)			Phone number with area code 931-668-5500, X1033
8. Mailing address (St./Rd./Hwy.) Same as site address			Fax number with area code
City	State	Zip code	Email address BurnettTerri@bfusa.com

CONTACT INFORMATION (BILLING)			
11. Billing contact Terri Burnett (Sr. Environmental Engineer)			Phone number with area code 931-668-5500, X1033
12. Mailing address (St./Rd./Hwy.) Same as site address			Fax number with area code
City	State	Zip code	Email address BurnettTerri@bfusa.com

TYPE OF PERMIT REQUESTED

13. Permit requested for:

Initial application to operate :	☐	Minor permit modification :	☐
Permit renewal to operate :	☐	Significant modification :	☐
Administrative permit amendment :	☐	Construction permit :	✔

(OVER)

HAZARDOUS AIR POLLUTANTS, DESIGNATIONS, AND OTHER PERMITS ASSOCIATED WITH FACILITY
14. Is this facility subject to the provisions governing prevention of accidental releases of hazardous air contaminants contained in Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations? [ ] Yes [✔] No If the answer is Yes, are you in compliance with the provisions of Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations? [ ] Yes [ ] No
15. If facility is located in an area designated as "Non-Attainment" or "Additional Control", indicate the pollutant(s) for the designation. N/A
16. List all valid Air Pollution permits issued to the sources contained in this application [identify all permits with most recent permit numbers and emission source reference numbers listed on the permit(s)]. Title V Permit # 569874 (Emission Source #89-0077). Subsources included in this application: 89-0077-02: Railcar and Trailer Unloading, Storage and Handling 89-0077-04 Manufacturing and Material Usage; 89-0077-05 Rubber Mixing and Milling; 89-0077-10 Power House; 89-0077-22 Tire Curing.
17. Page number: Revision number: Date of revision:

Public Version - Trade Secret Information Redacted

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 2

TITLE V PERMIT APPLICATION
OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

- 89-0077-02: Railcar and Trailer Unloading, Storage & Handling
- 89-0077-04: Manufacturing and Material Usage
- 89-0077-05: Rubber Mixing and Milling
- 89-0077-10: Two Boilers and One Hydronic Heater
- 89-0077-22: Tire Curing

Please refer to the attached Process Flow Diagrams in Appendix D

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

See Appendix E (Insignificant Activities)

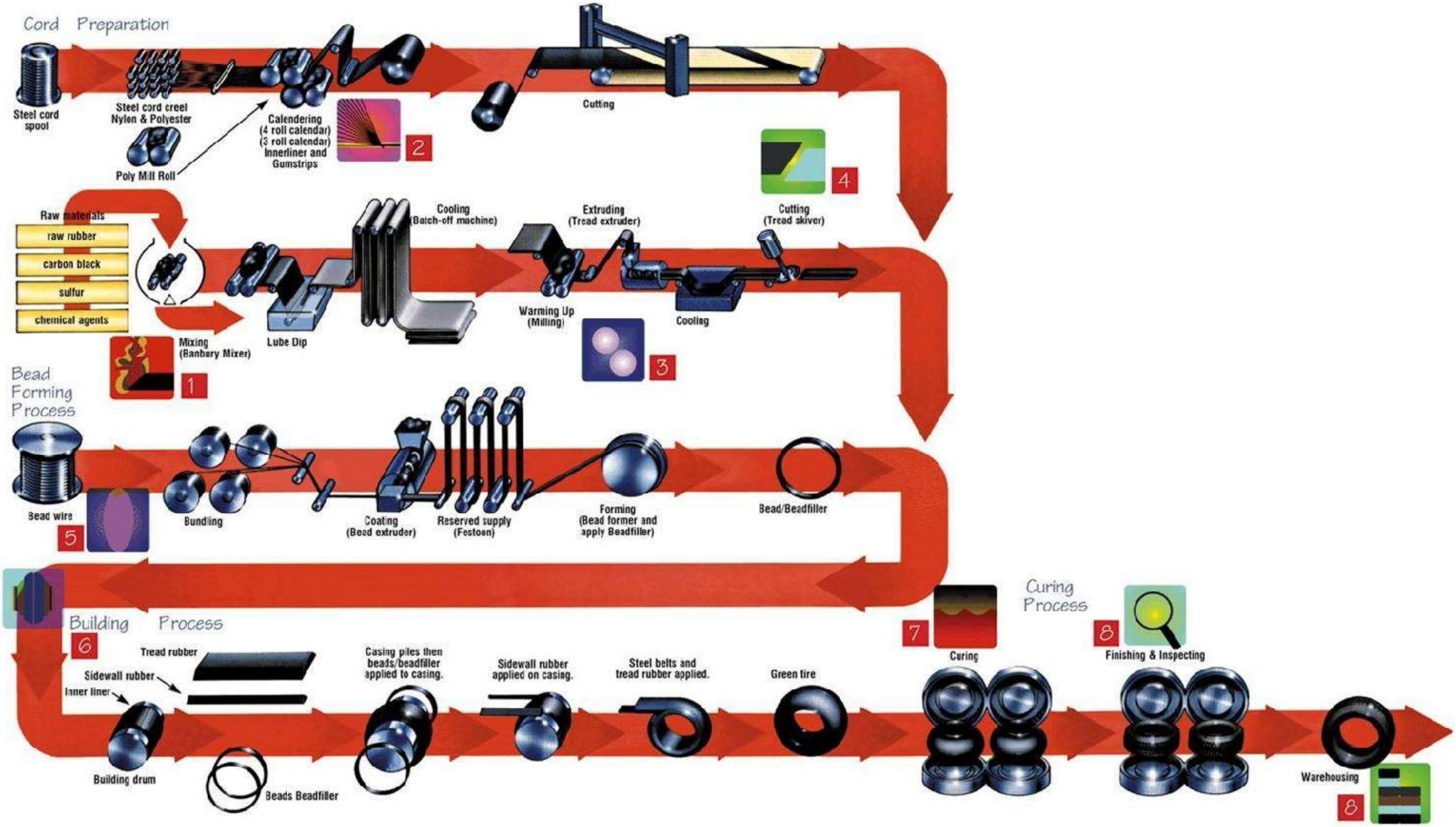
3. Are there any storage piles?

YES __________ NO ____X_____

4. List the states that are within 50 miles of your facility.

Alabama, Georgia

5. Page number: Revision Number: Date of Revision:


Cord Preparation
Steel cord spool
Steel cord creel
Nylon & Polyester
Poly Mill Roll
Calendering
(4 roll calendar)
(3 roll calendar)
Innerliner and
Gumstrips
2
Cutting
4
Raw materials
raw rubber
carbon black
sulfur
chemical agents
Mixing
(Banbury Mixer)
1
Lube Dip
Cooling
(Batch-off machine)
Warming Up
(Milling)
3
Extruding
(Tread extruder)
Cooling
Cutting
(Tread skiver)
Bead
Forming
Process
Bead wire
5
Bunding
Coating
(Bead extruder)
Reserved supply
(Festoon)
Forming
(Bead former and
apply Beadfiller)
Bead/Beadfiller
Building Process
6
Tread rubber
Sidewall rubber
Inner liner
Building drum
Beads Beadfiller
Casing plies then
beads/beadfiller
applied to casing.
Sidewall rubber
applied on casing.
Steel belts and
tread rubber applied.
Green tire
Curing
Process
7
Curing
8
Finishing & Inspecting
Warehousing
8

Public Version - Trade Secret Information Redacted

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 29

TITLE V PERMIT APPLICATION
EMISSION SUMMARY FOR THE FACILITY OR FOR THE SOURCES CONTAINED IN THIS APPLICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC - Warren Plant

EMISSIONS SUMMARY TABLE – CRITERIA AND SELECTED POLLUTANTS

2. Complete the following emissions summary for regulated air pollutants at this facility or for the sources contained in this application.

Air Pollutant	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)
Particulate Matter (TSP)	44.90			
Sulfur Dioxide	79.04			
Volatile Organic Compounds	553.8			
Carbon Monoxide	88.8			
Lead				
Nitrogen Oxides	110.02			
Total Reduced Sulfur				
Mercury				
Asbestos				
Beryllium				
Vinyl Chlorides				
Fluorides				
Gaseous Fluorides				
Greenhouse Gases in CO_2 Equivalents	147,401			

(Continued on next page)

(Continued from previous page)

EMISSIONS SUMMARY TABLE – HAZARDOUS AIR POLLUTANTS

3. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s) at this facility or for the sources contained in this application.

Air Pollutant & CAS	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 5, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 5, APC 28)
HAP (Individual)	< 10.0*			
HAPs (combined)	< 25.0*			
		*Note: HAP 12-month rolling		

4. Page number: Revision number: Date of revision:

Bridgestone Americas Tire Operations, LLC
Warren Plant

Plant-Wide Emissions Summary

Emission Source	Source Description	PM_{Total}		PM_{10}		$PM_{2.5}$		SO_2		NOx		CO		CO_2		CH_4		N_2O		CO_2eq	VOC	HAP
		(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(tpy)	tpy	tpy
89-0077-02	Railcar Unloading, Storage & Handling	3.90	1.78	3.90	1.78	0.90	0.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
89-0077-04	Manufacturing & Material Usage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	261.17	See Total
89-0077-05	Material Handling and Mixer Charging	37.99	11.32	37.99	11.32	8.74	2.60	--	--	--	--	--	--	--	--	--	--	--	--	--	180.62	See Total
89-0077-10	Two Boilers & One Hydronic Heater	3.78	10.87	3.78	10.87	3.78	10.87	24.39	53.46	22.90	68.37	13.20	57.82	26,137	98,257	1.06	3.09	0.21	0.54	98,496	3.79	See Total
	Proposed B & W Boiler (75 MMBtu/hr)	1.77	5.09	1.77	5.09	1.77	5.09	11.41	25.01	8.57	26.79	6.18	27.05	12,229	45,972	0.50	1.45	0.10	0.25	46,083	1.77	See Total
89-0077-18	Emergency Generator Engine (99 hp)	0.07	0.02	0.07	0.02	0.07	0.02	0.20	0.05	1.22	0.31	0.82	0.20	114	28	4.58E-03	1.15E-03	9.17E-04	2.29E-04	29	0.062	See Total
89-0077-19	Emergency Generator Engine (15 hp)	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.48	0.12	0.10	0.03	18	4	7.13E-04	1.78E-04	1.43E-04	3.56E-05	4	0.010	See Total
89-0077-20	Fire Pumps #1 and #2 (266 hp, each)	1.17	0.29	1.17	0.29	1.17	0.29	1.12	0.28	16.49	4.12	3.55	0.89	612	153	2.46E-02	6.16E-03	4.93E-03	1.23E-03	153	0.33	See Total
89-0077-21	300 gallon Gasoline Tank	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.048	See Total
89-0077-22	Tire Curing	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	104.77	See Total
Insignificant Activities																						
B1	Learning Center and Employee Services Boilers/Heaters	0.01	0.06	0.01	0.06	0.01	0.06	9.13E-04	4.00E-03	0.17	0.74	0.14	0.62	281	953	1.14E-02	1.95E-02	2.28E-03	2.23E-03	954	0.04	See Total
B2	Solvent Storage Tank	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.12	See Total
B3	Tire Spraying (Dopers)	0.52	2.26	0.52	2.26	0.52	2.26	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	See Total
B4	Cement Spray	0.12	0.54	0.12	0.54	0.12	0.54	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	See Total
B5	Tire Repair	0.67	2.92	0.67	2.92	0.67	2.92	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08	See Total
B6	Final Inspection Marking	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13	See Total
B7	Hot Knife Cutting	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
B8	Ultrasonic Knife	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
B9	Oil Storage Tanks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	See Total
B10	Tire Testing Room	0.02	0.10	0.02	0.10	0.02	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
B11	Electron Beam Generator (Precure Machine)	--	--	--	--	--	--	--	--	1.00	4.38	--	--	--	--	--	--	--	--	--	0.00	See Total
B12	Mold Cleaning	0.86	3.75	0.86	3.75	0.86	3.75	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
(B13)	Tread Grinders (REMOVED)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	See Total
B14	Inside Day Bins	0.50	2.21	0.50	2.21	0.50	2.21	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
C1	Two 30,000 gallon #2 Fuel Oil Storage Tanks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	See Total
C2	300 gallon Diesel Tanks (2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	See Total
C3	300 gallon Kerosene Tank	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0001	See Total
C5	Portable Diesel Air Compressors	2.00	0.24	2.00	0.24	2.00	0.24	1.87	0.22	28.43	3.41	6.12	0.73	1,059	127	4.26E-02	5.12E-03	8.53E-03	1.02E-03	128	0.300	See Total
C7	Standby Natural Gas Emergency Generator	0.004	0.001	0.004	0.001	0.004	0.001	4.60E-04	5.52E-05	1.78	0.213	2.75	0.330	43	10	4.89E-01	1.17E-01	8.62E-05	2.07E-05	13	0.003	See Total
C9	Two 550 gallon Diesel Tanks	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0003	See Total
C10	Space Heaters	0.06	0.12	0.06	0.12	0.06	0.12	0.004	0.01	0.73	1.57	0.61	1.16	866	1,896	1.63E-02	3.57E-02	1.63E-03	3.57E-03	1,898	0.087	See Total
C11	Water Cooling Towers	0.76	3.32	0.76	3.32	0.76	3.32	--	--	--	--	--	--	--	--	--	--	--	--	--	0.16	See Total
C12	Parts Washers	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.20	See Total
C13	Personal Protective Equipment Vacuum Stations	1.00	0.001	1.000	0.001	1.00	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	0.00	--
TOTAL PLANT-WIDE POTENTIAL EMISSIONS		**55.23**	**44.90**	**55.23**	**44.90**	**22.97**	**34.81**	**39.03**	**79.04**	**81.77**	**110.02**	**33.47**	**88.84**	**41,358**	**147,401**	**2.15**	**4.72**	**0.33**	**0.80**	**147,758**	**553.8**	**<10/25**

Bridgestone Americas Tire Operations, LLC
Warren Plant

[redacted] tires/day
Tires with silane/day
grams cement/tire
days/year
[redacted] tires/year

Margin
10%

VOC Emissions Summary			
		No Silane	Silane
Emission Source	Source Description	tpy	tpy
89-0077-02	Railcar Unloading, Storage & Handling	--	--
89-0077-04 Manufacturing & Material Usage	(Source 89-0077-05) Banbury	18.444	18.444
	Banbury Remill	0.066	0.066
	Wire Calender (4-Roll)	19.503	19.503
	Gum Calender (#3 and #4 Belt Cutter)	0.466	0.466
	Calender Profile (Profile/PREX)	0.595	0.595
	Innerliner Extruder (aka Rollerhead, PT Innerliner)	2.329	2.329
	All Purpose Extruders (#1, #3)	49.667	49.667
	Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)	0.672	0.672
	Wire Reinforcing Ext/Cal. (REX)	0.801	0.801
	Bead Filler (DSB)	0.256	0.256
	Bead Winder (HEX Winders)	0.024	0.024
	Rubber Mills (Refine Mill - Extrusion)	0.105	0.105
	TMA Stock Prep. (Rubber Used in Cement House)	0.002	0.002
	Curing Press Rm.	59.001	59.001
	Autoclave	0.045	0.045
	Solvent (Includes Cement)	175.594	175.594
	C264 Cement (70% solvent)	0.217	0.217
	TMS Cement (LOCTITE SI 5930 FIT 300ML)	0.776	0.776
	Marking Ink Usage - White (D1858)	0.622	0.622
	Orange Curable Jet Printer Ink D-3125	3.074	3.074
	Mold Spray ML-5401W	0.000	0.000
	Ink Jet Cleaner; L-420	0.323	0.323
	Black Repair Paint A-9387	2.900	2.900
	Dot Matrix Yellow Ink D4936	1.384	1.384
	Yellow Chlorobutyl Paint D-4361	0.000	0.000
	Inside Tire Spray Chem-Trend ML-3055	1.619	1.619
	Inside Tire Spray Chem-Trend ML-2012	0.001	0.001
	Inside Tire Spray Chem-Trend ML-3114	0.066	0.066
	Mold Release Chem-Trend ML-5419W	0.059	0.059
	Mold Release Chem-Trend ML-8187	0.001	0.001
	Mold Release Chem-Trend ML-3068	0.000	0.000
89-0077-05	Material Handling and Mixer Charging	--	--
89-0077-10	Two Boilers & One Hydronic Heater	3.786	3.786
	Proposed B & W Boiler (75 MMBtu/hr)	1.771	1.771
89-0077-18	Emergency Generator Engine (99 hp)	0.062	0.062
	Emergency Generator Engine (15 hp)	0.010	0.010
	Fire Pump #1 (266 hp)	0.167	0.167
	Fire Pump #2 (266 hp)	0.167	0.167
	Silane Injection	0.000	207.937

Insignificant Activities			
B1	Learning Center and Employee Services Boilers/Heaters	0.041	0.041
B2	Solvent Storage Tank	0.120	0.120
B3	Tire Spraying (Dopers) - PM only	--	--
B4	Cement Spray (PM only)	--	--
B5	Tire Repair	0.080	0.080
B6	Final Inspection Marking	0.125	0.125
B7	Hot Knife Cutting	--	--
B8	Ultrasonic Knife	--	--
B9	Oil Storage Tanks	0.044	0.044
B10	Tire Testing Room - PM only	--	--
B11	Electron Beam Generator (Precure Machine)	0.000	0.000
B12	Mold Cleaning - PM only	--	--
(B13)	Tread Grinders (REMOVED)	--	--
B14	Inside Day Bins	--	--
C1	Two 30,000 gallon #2 Fuel Oil Storage Tanks	0.040	0.040
C2	300 gallon Diesel Tanks (2)	0.0001	0.000
C3	300 gallon Kerosene Tank	0.0001	0.000
C4	300 gallon Gasoline Tank	0.048	0.048
C5	Portable Diesel Air Compressors	0.300	0.300
C6	Emergency Generator Engine (see above)	--	--
C7	Standby Natural Gas Emergency Generator	0.003	0.003
C8	Diesel Powered Emergency Water Pumps (see above)	--	--
C9	Two 550 gallon Diesel Tanks	0.0003	0.0003
C10	Space Heaters	0.087	0.087
C11	Water Cooling Towers	0.157	0.157
C12	Parts Washers	0.200	0.200
C13	Personal Protective Equipment Vacuum Stations	--	--
TOTAL PLANT-WIDE POTENTIAL EMISSIONS			
	VOC =	**345.8**	**553.8**
	ALL HAP =	**28.2**	**28.2**
	MAX INDIVIDUAL HAP =	**6.1**	**6.1**

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MATERIAL PROCESSING (89-0077-04)	2016 Production (tire/yr)	2016 Production (lbs/yr)	Potential Production			
	3,059,672	391,943,983	[redacted]			
	*Material Processed			RMA EF	VOC Emissions	
Process	2016 (lb/yr)	2016 (lb/lb Product)	Potential (lb/yr)	lb. VOC/ lb. Material Processed		ton/yr.
Banbury	315,311,015	[redacted]		6.86E-05		18.444
Banbury Remill	11,320,430	[redacted]		6.86E-06		0.066
Wire Calender (4-Roll)	50,183,169	[redacted]		4.56E-04		19.503
Gum Calender (#3 and #4 Belt Cutter)	3,655,367	[redacted]		1.50E-04		0.466
Calender Profile (Profile/PREX)	4,666,445	[redacted]		1.50E-04		0.595
Innerliner Extruder (aka Rollerhead, PT Innerliner)	40,987,751	[redacted]		6.67E-05		2.329
All Purpose Extruders (#1, #3)	124,691,162	[redacted]		4.67E-04		49.667
Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)	56,182,219	[redacted]		1.40E-05		0.672
Wire Reinforcing Ext/Cal. (REX)	6,287,507	[redacted]		1.50E-04		0.801
Bead Filler (DSB)	29,946,732	[redacted]		1.00E-05		0.256
Bead Winder (HEX Winders)	881,317	[redacted]		3.25E-05		0.024
Rubber Mills (Refine Mill - Extrusion)	543,283	[redacted]		2.26E-04		0.105
TMA Stock Prep. (Rubber Used in Cement House)	17,600	[redacted]		1.13E-04		0.002
Curing Press Rm.	309,060,055	[redacted]		2.24E-04		59.001
Autoclave	133,417	[redacted]		3.93E-04		0.045
Total rubber VOC emissions						**151.98**
Solvent Usage	Usage				VOC	
	2016 (gal/yr)	2016 (gal/lb Product)	Potential (gal/yr)	Density lb/gal	Weight Fraction	Emission (ton/yr)
Solvent (Includes Cement)	--	[redacted]		6.05	1.00	175.594
C264 Cement (70% solvent)	60	[redacted]		6.05	0.7	0.217
TMS Cement (LOCTITE SI 5930 FIT 300ML)	--	[redacted]		11.68	0.027	0.776
Marking Ink Usage - White (D1858)	125	[redacted]		6.91	0.85	0.622
Orange Curable Jet Printer Ink D-3125	590	[redacted]		6.48	0.94	3.074
Mold Spray ML-5401W	0	[redacted]		8.32	0.018	0.000
Ink Jet Cleaner; L-420	60	[redacted]		6.31	1.00	0.323
Black Repair Paint A-9387	600	[redacted]		6.62	0.86	2.900
Dot Matrix Yellow Ink D4936	264	[redacted]		6.53	0.94	1.384
Yellow Chlorobutyl Paint D-4361	0	[redacted]		8.36	0.63	0.000
Inside Tire Spray Chem-Trend ML-3055	58,500	[redacted]		9.84	0.0033	1.619
Inside Tire Spray Chem-Trend ML-2012	275	[redacted]		8.26	0.0005	0.001
Inside Tire Spray Chem-Trend ML-3114	--	[redacted]		9.51	0.0020	0.066
Mold Release Chem-Trend ML-5419W	1,650	[redacted]		8.34	0.0050	0.059
Mold Release Chem-Trend ML-8187	315	[redacted]		8.26	0.0003	0.001
Mold Release Chem-Trend ML-3068	0	[redacted]		8.34	0.0003	0.000
Sub Total Solvent VOC Emissions						186.64
Source Total VOC Emissions						**338.6**

*Material Processed means all material used in preparation of rubber or rubber products excluding steel wire and fabric used in rubber tire manufacturing.

Cement Station VOC Analysis

VOC Emissions		
Tires/day	[redacted]	
Cement gram/tire		
g VOC/g cement		
Operating Days/yr	365	
VOC Used	175.6	tpy

Maximum Annual Cement Used
[redacted]

Bridgestone Americas Tire Operations, LLC
Warren Plant

Silane Tire Manufacture Rate = [redacted]
Operating Schedule = 365 days/yr

Potential Silane Usage Rate

Annual Tire Production (tires/yr)	Silane Injection Rate (lb/tire)	Silane Density (lb/gal)	Annual Silane Usage (gal/yr)	Margin (%)	Potential Annual Silane Injection Rate (gal/yr)
[redacted]					

Ethanol Emissions From Silane Injection

Process	Emissions Factor (lbs ethanol/gal silane)	Ethanol Emissions (tpy)
Mixing	[redacted]	162.17
Curing		45.77
Total		**207.94**

Notes:
Ethanol emission factor based on disulfide silane.
Ethanol Emissions (tpy) = Potential Silane Injection rate (gal/yr) x Silane Emission Factor (lb/gal) / 2000 (lb/ton)

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

RAILCAR AND TRAILER UNLOADING, STORAGE & HANDLING PROCESS EMISSION SOURCE: 89-0077-02

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William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
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APC 10

TITLE V PERMIT APPLICATION
MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Process emission source (identify):**
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification(s):
See Attachment - APC 10 - Source 02 Stack ID's

4. Year of construction or last modification:
2023

If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.

5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.

6. Location of this process emission source in UTM coordinates: UTM Vertical: 601565 UTM Horizontal: 3943593

7. Describe this process (Please attach a flow diagram of this process) and check one of the following:

☑ Batch ☐ Continuous

PROCESS MATERIAL INPUT AND OUTPUT

8. List the types and amounts of raw materials input to this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Carbon Black	pneumatically transferred to silos	varies	[redacted] lbs/hr
Clay	pneumatically transferred to silos	[redacted]bs/hr	[redacted] lbs/hr
Pigment	transferred from supersack to mixer or pigmnt can	[redacted]bs/hr	[redacted] lbs/hr

9. List the types and amounts of primary products produced by this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
N/A			

10. Process fuel usage:

Type of fuel	Max heat input (10^6 BTU/Hr.)	Average usage (units)	Maximum usage (units)
N/A			

11. List any solvents, cleaners, etc., associated with this process:
N/A

If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.

12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary).

13. Page number: Revision Number: Date of Revision:

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): B-DCEF-FP2 (Final Pigment Dust Collector)	
4. Stack height above grade in feet: 106.0	
5. Velocity (data at exit conditions): 63.2 (Actual feet per second)	6. Inside dimensions at outlet in feet: 2.5
7. Exhaust flow rate at exit conditions (ACFM): 18,600	8. Flow rate at standard conditions (DSCFM): 18,345
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-RRBH-003	
4. Stack height above grade in feet: 10.0	
5. Velocity (data at exit conditions): 18.3 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.17 x 1.17 ft
7. Exhaust flow rate at exit conditions (ACFM): 1,500	8. Flow rate at standard conditions (DSCFM): 1,479
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-011 (Carbon Black Silo 11)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
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2. **Emission source (identify):**
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
CB-STEF-012 (Carbon Black Silo 12)

4. Stack height above grade in feet:
92.0

5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)

11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only):
N/A (°F)

12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)?
N/A

Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.

BYPASS STACK DESCRIPTION

13. Do you have a bypass stack?
_____ Yes X No

If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.

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2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-013 (Carbon Black Silo 13)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
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2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-014 (Carbon Black Silo 14)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-015 (Carbon Black Silo 15)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-016 (Carbon Black Silo 16)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-017 (Carbon Black Silo 17)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-018 (Carbon Black Silo 18)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-019 (Carbon Black Silo 19)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CB-STEF-020 (Carbon Black Silo 20)	
4. Stack height above grade in feet: 92.0	
5. Velocity (data at exit conditions): 14.9 (Actual feet per second)	6. Inside dimensions at outlet in feet: 1.25 x 0.6
7. Exhaust flow rate at exit conditions (ACFM): 700	8. Flow rate at standard conditions (DSCFM): 690
9. Exhaust temperature: 70.0 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1.0 Percent; 0.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes X No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
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Attachment – APC 10 – Source 02 Stack ID’s

Stack ID's Associated with process emission source

CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling:

CB-STEF-001 to 010 (Carbon Black Silos)

CB-STEF-011 to 020 (new Carbon Black Silos)

CB-621V-001 to 010 (621 day bins)

CB-623V-001 to 010 (623 day bins)

CB-RRBH-001 & -002 (Railcar/trailer carbon black unload dust collectors)

CB-RRBH-003 (new Railcar/trailer carbon black unload dust collector)

CLAY-001 (Clay Silo Bin Vent Exhaust)

B-DCEF-FP1 (Final pigment dust collector)

B-DCEF-FP2 (new Final pigment dust collector)

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-DCEF-FP2 (Final Pigment Dust Collector #2)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Dust collector used for raw material recovery. Pressure drop monitored - normal range 1.0" minimum to 6.0"

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification(s):
CB-RRBH-003 (Railcar/Trailer Carbon Black Unload Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material? Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
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2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-011 (Carbon Black Silo 11 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-012 (Carbon Black Silo 12 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source (identify): CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-013 (Carbon Black Silo 13 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available): N/A	6. Year of installation: 2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source (identify): CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling
3. Stack ID or flow diagram point identification (s): CB-STEF-014 (Carbon Black Silo 14 Dust Collector)	

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available): N/A	6. Year of installation: 2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.

Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating

N/A

10. Does the baghouse collect asbestos containing material?

Yes [ ] No [✔]

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.

N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-015 (Carbon Black Silo 15 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Emission source (identify):
Bridgestone Americas Tire Operations, LLC, Warren Plant	CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification(s):
CB-STEF-016 (Carbon Black Silo 16 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):	6. Year of installation:
N/A	2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
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2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-017 (Carbon Black Silo 17 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-018 (Carbon Black Silo 18 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

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Division of Air Pollution Control
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312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

3. Stack ID or flow diagram point identification (s):
CB-STEF-019 (Carbon Black Silo 19 Dust Collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.
Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?
Yes ☐ No ☑
If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
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Nashville, TN 37243
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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source (identify): CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling
3. Stack ID or flow diagram point identification (s): CB-STEF-020 (Carbon Black Silo 20 Dust Collector)	

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Cartridge filters used for air pollution control.

5. Manufacturer and model number (if available): N/A	6. Year of installation: 2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99.9	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.

Carbon black is reused.

9. If the bags are coated, specify the material used for coating and frequency of coating

N/A

10. Does the baghouse collect asbestos containing material?

Yes ☐ No ☑

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.

N/A

12. Page number: Revision Number: Date of Revision:

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APC 19

TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant
2. Process emission source, fuel burning installation, or incinerator (identify): CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling
3. Stack ID or flow diagram point identification(s): See Attachment - APC 10 - Source 02 Stack ID's

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- [ ] Continuous Emission Monitoring (CEM) - APC 20
  Pollutant(s): ____
- [ ] Emission Monitoring Using Portable Monitors - APC 21
  Pollutant(s): ____
- [ ] Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
  Pollutant(s): ____
- [x] Monitoring Maintenance Procedures - APC 23
  Pollutant(s): Particulate Matter
- [ ] Stack Testing - APC 24
  Pollutant(s): ____
- [ ] Fuel Sampling & Analysis (FSA) - APC 25
  Pollutant(s): ____
- [ ] Recordkeeping - APC 26
  Pollutant(s): ____
- [ ] Other (please describe) - APC 27
  Pollutant(s): ____

5. Compliance certification reports will be submitted to the Division according to the following schedule:

   Start date: One year after permit issuance

   And every 365 days thereafter.

6. Compliance monitoring reports will be submitted to the Division according to the following schedule:

   Start date: Six months after permit issuance

   And every 180 days thereafter.

7. Page number: Revision number: Date of revision:

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Department of Environment and Conservation
Division of Air Pollution Control
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TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY MONITORING MAINTENANCE PROCEDURES

The monitoring of a maintenance procedure shall be acceptable as a compliance demonstration method provided that a correlation between the procedure and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:

Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Stack ID or flow diagram point identification(s):

See Attachment - APC 10 - Source 02 Stack ID's

3. Emission source (identify):

CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:

Particulate matter

5. Procedure being monitored:

Dust collector inspection and maintenance

6. Description of the method of monitoring and establishment of correlation between the procedure and the emission rate of a particular pollutant:

Dust collector emissions are guaranteed by the vendor at 99.9%. Proper upkeep of the dust collectors will, therefore, yield a control efficiency commensurate with the vendor's guarantee. Quarterly inspections of the dust collector are currently being conducted and maintenance performed as required. Compliance has been achieved during the previous permit term using this method.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

Quarterly

8. Page number: Revision number: Date of revision:

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Department of Environment and Conservation
Division of Air Pollution Control
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APC 28

TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC - Warren Plant	2. Stack ID or flow diagram point identification(s): See Attachment - APC 10 - Source 02 Stack ID's

3. Process emission source / Fuel burning installation / Incinerator (identify):
CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Particulate Matter (TSP)	1.78		1.78	
(Fugitive Emissions)	N/A		N/A	
Sulfur Dioxide	N/A		N/A	
(Fugitive Emissions)				
Volatile Organic Compounds	N/A		N/A	
(Fugitive Emissions)				
Carbon Monoxide	N/A		N/A	
(Fugitive Emissions)				
Lead	N/A		N/A	
(Fugitive Emissions)				
Nitrogen Oxides	N/A		N/A	
(Fugitive Emissions)				
Total Reduced Sulfur	N/A		N/A	
(Fugitive Emissions)				
Mercury	N/A		N/A	
(Fugitive Emissions)				

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Asbestos	N/A		N/A	
(Fugitive Emissions)				
Beryllium	N/A		N/A	
(Fugitive Emissions)				
Vinyl Chloride	N/A		N/A	
(Fugitive Emissions)				
Fluorides	N/A		N/A	
(Fugitive Emissions)				
Gaseous Fluorides	N/A		N/A	
(Fugitive Emissions)				
Greenhouse Gases in CO_2 Equivalents	N/A		N/A	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
N/A	N/A		N/A	

6. Page number: Revision number: Date of revision

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APC 30

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Emission source number
Bridgestone Americas Tire Operations, LLC, Warren Plant	CB (89-0077-02)

3. Describe the process emission source / fuel burning installation / incinerator.

CB (89-0077-02) - Railcar and Trailer Unloading, Storage and Handling

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
CB-RRBH-001, 002, & 003	Particulate	1200-03-07-.01(5)			
CB-STEF-001 to 010	Particulate	1200-03-07-.01(5)			
CB-STEF-011 to 020	Particulate	1200-03-07-.01(5)			
CB-621V-001 to 010	Particulate	1200-03-07-.01(5)			
CB-623V-001 to 010	Particulate	1200-03-07-.01(5)	Previous Permit		
CLAY-001	Particulate	1200-03-07-.01(5)	8.1 lbs/hr all		
B-DCEF-FP1	Particulate	1200-03-07-.01(5)	Total combined limit to avoid PSD	total combined	
B-DCEF-FP2	Particulate	1200-03-07-.01(5)	3.90 lbs/hr all	3.90 lbs/hr all	IN
			1.78 Tons/Year all	1.78 Tons/Year all	IN

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

N/A					

11. Page number: Revision number: Date of revision:

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FUTURE ACTUAL PM EMISSIONS
Bridgestone Americas Tire Operations, Inc.
Warren County Plant

[redacted]

Source	Point Number	Pollutant	Emission Factor (lb PM / lb Matl)	Potential		Total (a)		PM_{10} (b)		$PM_{2.5}$ (c)	
				(lb/hr)	(lb/yr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Railcar and Trailer Unloading, Storage, and Holding (89-0077-02)	CB-RRBH-001	PM	[redacted]			0.03	0.03	0.03	0.03	0.01	0.01
	CB-RRBH-002	PM				0.13	0.11	0.13	0.11	0.03	0.03
	CB-RRBH-003	PM				0.13	0.11	0.13	0.11	0.03	0.03
	CB-STEF-001 to CB-STEF-020	PM				0.18	0.16	0.18	0.16	0.04	0.04
	CB-621V-001 to CB-621V-010 & CB-623V-001 to CB-623-V-010	PM				0.24	0.21	0.24	0.21	0.05	0.05
	CLAY001	PM				0.05	0.0014	0.05	0.0014	0.01	0.0003
	B-DCEF-FP1	PM				1.57	0.57	1.57	0.57	0.36	0.13
	B-DCEF-FP2	PM				1.57	0.57	1.57	0.57	0.36	0.13
TOTAL						**3.90**	**1.78**	**3.90**	**1.78**	**0.90**	**0.41**

Bridgestone Americas Tire Operations, LLC
Warren Plant

PM Emission Factor Development

Source	Stack I.D.	Source Description	Temp. deg. F	Temp deg. R	Moisture %	Flow Rate Actual CFM	Flow Rate DSCFM	PM Emissions (lb/hr)	Max Throughput (lb/hr)	Emission Factor (lb PM / lb Matl)	
								0.01 gr/dscf			
-02	CB-RRBH-001	Rail Unloading Baghouse	70	530	1	400	395	0.034	[redacted]	[redacted]	
-02	CB-RRBH-002	Rail Unloading Baghouse	70	530	1	1,500	1,479	0.127	[redacted]	[redacted]	
-02	CB-RRBH-003	Rail Unloading Baghouse	70	530	1	1,500	1,479	0.127	[redacted]	[redacted]	
-02	CB-STEF	Silo Exhaust (Pre-Expansion)	70	530	1	700	690	0.118	[redacted]	[redacted]	Two Silos can be loaded at a time
-02	CB-STEF	Silo Exhaust (Post-Expansion)	70	530	1	700	690	0.178	[redacted]	[redacted]	Three Silos can be loaded at a time
-02	CB-621V & CB-623V	BB Day Bin Vents	70	530	1	700	690	0.237	[redacted]	[redacted]	Four bins can be loaded at one time.
-02	B-DCEF-FP	Fin. Pigment Dust Coll.	70	530	1	18,600	18,345	1.572	[redacted]	[redacted]	
-02	CLAY-001	Clay Silo Bin Vent	70	530	1	650	641	0.055	[redacted]	[redacted]	
-05	B-DCEF-P	Pigment Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-CL	Clay Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-C	Carbon Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-C (Tandem)	Carbon Dust Coll.(Tandem)	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

MANUFACTURING AND MATERIAL USAGE

PROCESS EMISSION SOURCE: 89-0077-04

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
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Nashville, TN 37243
Telephone: (615) 532-0554

APC 10

TITLE V PERMIT APPLICATION
MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Process emission source (identify):**
MM (89-0077-04) - Manufacturing and Material Usage

3. Stack ID or flow diagram point identification(s):
See attachment APC10.3-A

4. Year of construction or last modification:
2019 (Op Flex Letter, Submitted Aug. 2019)

If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.

5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.

6. Location of this process emission source in UTM coordinates: UTM Vertical: 601473 UTM Horizontal: 3943484

7. Describe this process (Please attach a flow diagram of this process) and check one of the following:

[✔] Batch [ ] Continuous

PROCESS MATERIAL INPUT AND OUTPUT

8. List the types and amounts of raw materials input to this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Rubber, wire, fabric, paints, solvents	Pallets, fork lifts, carts, piping, tanks	Varies	[redacted] tons rubber/yr

9. List the types and amounts of primary products produced by this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Tire Components and	Stored on skids and transported by forklift	Varies	[redacted] tons/year
Uncured Tires			

10. Process fuel usage:

Type of fuel	Max heat input (10^6 BTU/Hr.)	Average usage (units)	Maximum usage (units)
N/A	N/A		

11. List any solvents, cleaners, etc., associated with this process:

Calumet 210-245 <1%", containing low-boiling petroleum distillates from light distillate hydro-treating process.

If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.

12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary).

13. Page number: Revision Number: Date of Revision:

Attachment 10.3-A

Stack ID's Associated with process emission source

MM (89-0077-04) Stack IDs:

General building exhaust:

CL-CMEF-001 (4-Roll Calender Mill Hood Exhaust)	**(Existing)**
EX-TCEF-001 through -005 (Cement Application Exhausts)	**(Existing)**
EX-TCEF-006 through -008 (Cement Application Exhausts)	**(Proposed)**
SC-PEEF-001 (Profile Extruder Exhaust)	**(Existing)**
SC-PTEF-001 (Inner Liner Microwave Exhaust)	**(Existing)**
SC-BEI-001 (Belt Edge Insert Extruder Exhaust)	**(Existing)**
CH-HDEF-001 (Cement Mixing Room Exhaust)	**(Existing)**
CH-TDEF-002 (Cement Mixing Room Exhaust)	**(Existing)**
CH-BDEF-003 (Cement Mixing Room Exhaust)	**(Existing)**
CH-WTV-001 (West Cement Mix Tank Vent)	**(Existing)**
CH-MTV-002 (Cement Storage Tank Vent)	**(Existing)**
CH-ETV-003 (East Cement Mix Tank Vent)	**(Existing)**

State of Tennessee
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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** MM (89-0077-04) - Manufacturing and Material Usage	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): EX-TCEF-006 (cementer #6)	
4. Stack height above grade in feet: 35	
5. Velocity (data at exit conditions): 44.57 (Actual feet per second)	6. Inside dimensions at outlet in feet: 2.3
7. Exhaust flow rate at exit conditions (ACFM): 11,111	8. Flow rate at standard conditions (DSCFM): 10,958
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Emission source (identify):**
MM (89-0077-04) - Manufacturing and Material Usage

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
EX-TCEF-007 (cementer #7)

4. Stack height above grade in feet:
35

5. Velocity (data at exit conditions):
44.57 (Actual feet per second)

6. Inside dimensions at outlet in feet:
2.3

7. Exhaust flow rate at exit conditions (ACFM):
11,111

8. Flow rate at standard conditions (DSCFM):
10,958

9. Exhaust temperature:
70 Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):
1 Percent   5.01 Grains per dry standard cubic foot (gr./dscf.)

11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only):
N/A (°F)

12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)?
N/A

Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.

BYPASS STACK DESCRIPTION

13. Do you have a bypass stack?
________ Yes   XX No

If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.

14. Page number: Revision Number: Date of Revision:

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Emission source (identify):**
MM (89-0077-04) - Manufacturing and Material Usage

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
EX-TCEF-008 (cementer #8)

4. Stack height above grade in feet:
35

5. Velocity (data at exit conditions):
44.57 (Actual feet per second)

6. Inside dimensions at outlet in feet:
2.3

7. Exhaust flow rate at exit conditions (ACFM):
11,111

8. Flow rate at standard conditions (DSCFM):
10,958

9. Exhaust temperature:
70 Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):
1 Percent
5.01 Grains per dry standard cubic foot (gr./dscf.)

11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only):
N/A (°F)

12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)?
N/A

Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.

BYPASS STACK DESCRIPTION

13. Do you have a bypass stack?
________ Yes XX No

If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.

14. Page number: Revision Number: Date of Revision:

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APC 19

TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant
2. Process emission source, fuel burning installation, or incinerator (identify): MM (89-0077-04) - Manufacturing and Material Usage
3. Stack ID or flow diagram point identification(s): See attachment APC10.3-A

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- [ ] Continuous Emission Monitoring (CEM) - APC 20
  Pollutant(s): ______
- [ ] Emission Monitoring Using Portable Monitors - APC 21
  Pollutant(s): ______
- [ ] Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
  Pollutant(s): ______
- [ ] Monitoring Maintenance Procedures - APC 23
  Pollutant(s): ______
- [ ] Stack Testing - APC 24
  Pollutant(s): ______
- [ ] Fuel Sampling & Analysis (FSA) - APC 25
  Pollutant(s): ______
- [x] Recordkeeping - APC 26
  Pollutant(s): VOC, VOC Content
- [ ] Other (please describe) - APC 27
  Pollutant(s): ______

5. Compliance certification reports will be submitted to the Division according to the following schedule:
   Start date: One year after permit issuance
   And every 365 days thereafter.
6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
   Start date: Six months after permit issuance
   And every 180 days thereafter.
7. Page number: Revision number: Date of revision:

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State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
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Telephone: (615) 532-0554

APC 26

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Stack ID or flow diagram point identification(s):
See attachment APC10.3-A

3. Emission source (identify):
MM (89-0077-04) - Manufacturing and Material Usage

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:
VOC, VOC Content, and HAPs associated with rubber processing and other miscellaneous materials

5. Material or parameter being monitored and recorded:
Rubber processed, cement usage, paint and ink usage, and miscellaneous solvent usage.

6. Method of monitoring and recording:

VOC and HAP Emission Rates
Monthly quantities of materials referenced in section 5 above will be recorded. VOC and HAP emissions resulting from processed rubber will be calculated using AP-42 emission factors developed by the Rubber Manufacturing Association. Other VOC and HAP emissions will be quantified by mass balance. Compliance with the allowable limit will be based on a 12-month rolling period.

VOC Content
VOC content will be calculated over an average monthly basis using available information on materials, VOC content (MSDS, technical data, etc.), and materials usage.

See example "Materials Processing-Monthly Log, VOCs" and "Material Processing-Monthly Log, HAPs"

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
12 month rolling sum for VOC and HAP allowable emission rates.

8. Page number: Revision number: Date of revision:

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APC 28

TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Stack ID or flow diagram point identification(s):
Bridgestone Americas Tire Operations, LLC, Warren Plant	See attachment APC10.3-A

3. Process emission source / Fuel burning installation / Incinerator (identify):
MM (89-0077-04) - Manufacturing and Material Usage

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Particulate Matter (TSP)	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Sulfur Dioxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Volatile Organic Compounds	206.17		206.17	
(Fugitive Emissions)	N/A		N/A	
Carbon Monoxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Lead	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Nitrogen Oxides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Total Reduced Sulfur	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Mercury	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Asbestos	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Beryllium	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Vinyl Chloride	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Gaseous Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Greenhouse Gases in CO_2 Equivalents	N/A		N/A	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Facility-Wide HAP Limit	9.9 (Single HAP)		9.9 (Single HAP)	
Facility-Wide HAP Limit	24.9 (Total HAP)		24.9 (Total HAP)	

6. Page number: Revision number: Date of revision

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APC 30

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source number MM (89-0077-04)
3. Describe the process emission source / fuel burning installation / incinerator. Manufacturing and Material Usage	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Entire section	VOC	1200-3-7-.02 (2)	553.8 tpy	553.8 tpy	In
			(Facility-Wide)	(Facility-Wide)	
Entire Section	HAP (various)		9.9 tpy indiv. HAP	9.9 tpy indiv. HAP	In
			(Facility-Wide)	(Facility-Wide)	
Entire Section	HAP (various)		24.9 tpy total HAP	24.9 tpy total HAP	In
			(Faciltiy-Wide)	(Facility-Wide)	

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

N/A					

11. Page number: Revision number: Date of revision:

MATERIAL PROCESSING (89-0077-04)

	2016 Production (tire/yr)	2016 Production (lbs/yr)	Potential Production			
	[redacted]	[redacted]	[redacted]			
	*Material Processed			RMA EF	VOC Emissions	
Process	2016 (lb/yr)	2016 (lb/lb Product)	Potential (lb/yr)	lb. VOC/ lb. Material		ton/yr.
Banbury	[redacted]	[redacted]	[redacted]	[redacted]		18.444
Banbury Remill	[redacted]	[redacted]	[redacted]	[redacted]		0.066
Wire Calender (4-Roll)	[redacted]	[redacted]	[redacted]	[redacted]		19.503
Gum Calender (#3 and #4 Belt Cutter)	[redacted]	[redacted]	[redacted]	[redacted]		0.466
Calender Profile (Profile/PREX)	[redacted]	[redacted]	[redacted]	[redacted]		0.595
Innerliner Extruder (aka Rollerhead, PT Innerliner)	[redacted]	[redacted]	[redacted]	[redacted]		2.329
All Purpose Extruders (#1, #3)	[redacted]	[redacted]	[redacted]	[redacted]		49.667
Sidewall Belt Edge Ext. (8x8x8, and #4 - BEI only)	[redacted]	[redacted]	[redacted]	[redacted]		0.672
Wire Reinforcing Ext/Cal. (REX)	[redacted]	[redacted]	[redacted]	[redacted]		0.801
Bead Filler (DSB)	[redacted]	[redacted]	[redacted]	[redacted]		0.256
Bead Winder (HEX Winders)	[redacted]	[redacted]	[redacted]	[redacted]		0.024
Rubber Mills (Refine Mill - Extrusion)	[redacted]	[redacted]	[redacted]	[redacted]		0.105
TMA Stock Prep. (Rubber Used in Cement House)	[redacted]	[redacted]	[redacted]	[redacted]		0.002
Curing Press Rm.	[redacted]	[redacted]	[redacted]	[redacted]		59.001
Autoclave	[redacted]	[redacted]	[redacted]	[redacted]		0.045
Total rubber VOC emissions						**151.98**

Solvent Usage	Usage				VOC	
	2016	2016	Potential	Density lb/gal	Weight Fraction	Emission (ton/yr)
Solvent (Includes Cement)	[redacted]	[redacted]	[redacted]	[redacted]	1.00	175.594
C264 Cement (70% solvent)	[redacted]	[redacted]	[redacted]	[redacted]	0.7	0.217
TMS Cement (LOCTITE SI 5930 FIT 300ML)	[redacted]	[redacted]	[redacted]	[redacted]	0.027	0.776
Marking Ink Usage - White (D1858)	[redacted]	[redacted]	[redacted]	[redacted]	0.85	0.622
Orange Curable Jet Printer Ink D-3125	[redacted]	[redacted]	[redacted]	[redacted]	0.94	3.074
Mold Spray ML-5401W	[redacted]	[redacted]	[redacted]	[redacted]	0.018	0.000
Ink Jet Cleaner; L-420	[redacted]	[redacted]	[redacted]	[redacted]	1.00	0.323
Black Repair Paint A-9387	[redacted]	[redacted]	[redacted]	[redacted]	0.86	2.900
Dot Matrix Yellow Ink D4936	[redacted]	[redacted]	[redacted]	[redacted]	0.94	1.384
Yellow Chlorobutyl Paint D-4361	[redacted]	[redacted]	[redacted]	[redacted]	0.63	0.000
Inside Tire Spray Chem-Trend ML-3055	[redacted]	[redacted]	[redacted]	[redacted]	0.0033	1.619
Inside Tire Spray Chem-Trend ML-2012	[redacted]	[redacted]	[redacted]	[redacted]	0.0005	0.001
Inside Tire Spray Chem-Trend ML-3114	[redacted]	[redacted]	[redacted]	[redacted]	0.0020	0.066
Mold Release Chem-Trend ML-5419W	[redacted]	[redacted]	[redacted]	[redacted]	0.0050	0.059
Mold Release Chem-Trend ML-8187	[redacted]	[redacted]	[redacted]	[redacted]	0.0003	0.001
Mold Release Chem-Trend ML-3068	[redacted]	[redacted]	[redacted]	[redacted]	0.0003	0.000
Sub Total Solvent VOC Emissions						186.64
Source Total VOC Emissions						**338.6**

*Material Processed means all material used in preparation of rubber or rubber products excluding steel wire and fabric used in rubber tire manufacturing.

Cement Station VOC Analysis

VOC Emissions		
Tires/day	[redacted]	
[redacted]		
Operating Days/yr	365	
VOC Used	175.6	tpy

Maximum Annual Cement Used
[redacted]

Bridgestone Americas Tire Operations, LLC
Warren Plant

Silane Tire Manufacture Rate =	[redacted]	tires/day
Operating Schedule =	365	days/yr

Potential Silane Usage Rate

Annual Tire Production (tires/yr)	Silane Injection Rate (lb/tire)	Silane Density (lb/gal)	Annual Silane Usage (gal/yr)	Margin (%)	Potential Annual Silane Injection Rate (gal/yr)
[redacted]					

Ethanol Emissions From Silane Injection

Process	Emissions Factor (lbs ethanol/gal silane)	Ethanol Emissions (tpy)
Mixing	[redacted]	162.17
Curing		45.77
Total		**207.94**

Notes:
Ethanol emission factor based on disulfide silane.
Ethanol Emissions (tpy) = Potential Silane Injection rate (gal/yr) x Silane Emission Factor (lb/gal) / 2000 (lb/ton)

Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-04)

Manufacturing and Material Usage VOC Emissions

Calculation Methodology:

Process VOC Emissions (tons/month) = Material Processed (lbs/month) x RMA Curing Emission Factor (lb VOC/lb Material Processed)/2000

Non-Rubber Processing VOC Emissions (tons/month) = Material Used (gal/mon) x Density (lbs/gal) x Volatile Weight Fraction/2000

EXAMPLE MATERIAL PROCESSING-MONTHLY LOG, VOCs (89-0077-04) Month Year

	*Material Processed	RMA EF	VOC Emissions	
Process	lb./mo.	lb. VOC/ lb. Material Processed		ton/mo.
Wire Calender		[redacted]		
Gum Calender (Belt Cutter)				
Calender Profile (Profile/PREX)				
Innerliner Extruder				
All Purpose Extruders (aka tread tubers)				
Sidewall Belt Edge Ext.				
Wire Reinforcing Ext/Cal.				
Bead Filler				
Bead Winder (aka wire winders)				
Rubber Mills (Refine Mill - Extrusion)				
TMA Stock Prep. (Rubber Used in Cement House)				
Autoclave				
Total rubber processing VOC emissions				
			VOC	
	Usage	Density	Weight	Emission
Non-Rubber Processing VOC sources	gal/mo.	lb./gal	Fraction	ton/mo.
Cement Solvent		[redacted]	1.00	
TMS Cement			0.027	
Marking Inks			0.85	
Mold Sprays			0.018	
Ink Jet Cleaner			1.00	
Marking and Repair Paints			0.63	
Inside Tire Sprays			0.0033	
Confidential Material (Mold Release)			NA	
Sub Total Solvent VOC Emissions				
Source Total VOC Emissions				

*Material Processed means all material used in preparation of rubber or rubber products excluding steel wire and fabric used in rubber tire manufacturing.

Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-04)

Manufacturing and Material Usage HAP Emissions

Calculation Methodology: HAP Emissions (tons/month) = Material Processed (lbs/month) x RMA HAP Emission Factor by process (lb HAP/lb Material Processed)/2000

EXAMPLE MATERIAL PROCESSING-MONTHLY LOG, HAPs (89-0077-04)

Month___ ____ Year____

Process	Material processed (lb/mo)		HAP 1 Factor (lb HAP/lb Matrl or %)	HAP 1 Emission (tons/mo)	HAP 2 Factor (lb HAP/lb Matrl or %)	HAP 2 Emission (tons/mo.)	. . .	HAP n Factor (lb HAP/lb Matrl or %)	HAP n Emission (tons/mo.)
Wire Calender									
Gum Calender									
Calender Profile									
Innerliner Extruder									
Process n									
Total Ind. HAPs (tons/mo) =				Monthly Sum of HAP 1		Monthly Sum of HAP 2			Monthly Sum of HAP n
Total Individual HAPs Rolling 12-month emissions (tons/yr) =				12-month Sum of HAP 1		12-month Sum of HAP 2			12-month Sum of HAP n

Total HAP Emissions	Month: ______	
Total Monthly HAP Emissions =	Sum of all HAPs	tons/mo
Total HAP 12-month Rolling Emissions =	12-month sum of all HAPS	tons/year

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

RUBBER MIXING AND MILLING

PROCESS EMISSION SOURCE: 89-0077-05

State of Tennessee
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APC 10

TITLE V PERMIT APPLICATION
MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Process emission source (identify):**
B (89-0077-05) - Rubber Mixing and Milling

3. Stack ID or flow diagram point identification(s): See Attachment 10.2-A

4. Year of construction or last modification: 2018

If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.

5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.

6. Location of this process emission source in UTM coordinates: UTM Vertical: 601222 UTM Horizontal: 3943481

7. Describe this process (Please attach a flow diagram of this process) and check one of the following:

☑ Batch ☐ Continuous

PROCESS MATERIAL INPUT AND OUTPUT

8. List the types and amounts of raw materials input to this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Carbon Black	pneumatic, mechanical, and manual transfer to mixers	varies	[redacted]
Clay	pneumatic, mechanical, and manual transfer to mixers	varies	
Pigments/additives/oils	pneumatic, mechanical, and manual transfer to mixers	varies	
Rubber	Mechanical transfer to mixer		

9. List the types and amounts of primary products produced by this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Rubber (final)	Stored on skids and transported by forklift	Varies	[redacted]

10. Process fuel usage:

Type of fuel	Max heat input (10^6 BTU/Hr.)	Average usage (units)	Maximum usage (units)
N/A	N/A		

11. List any solvents, cleaners, etc., associated with this process:
N/A

If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.

12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary).

13. Page number: Revision Number: Date of Revision:

Attachment 10.2-A

Stack ID's Associated with process emission source

Rubber Mixing and Milling (89-0077-05)

Stack IDs:

B-MVEF-621 through -625 (Banbury Mill Vent Exhausts)	**(Existing)**
B-DCEF-621C (621 Carbon black dust collector)	**(Existing)**
B-DCEF-621P (621 Pigment dust collector)	**(Existing)**
B-DCEF-622P (622 Pigment dust collector)	**(Existing)**
B-DCEF-623C (623 Carbon black dust collector)	**(Existing)**
B-DCEF-623P (623 Pigment dust collector)	**(Existing)**
B-DCEF-624C (624 Carbon black dust collector)	**(Existing)**
B-DCEF-625C (625 Carbon black dust collector)	**(Existing)**
B-DCEF-625CL (625 Clay dust collector)	**(Existing)**
B-DCEF-626C (626 Carbon black dust collector)	**(Proposed)**
B-DCEF-626CL (626 Clay dust collector)	**(Proposed)**
B-DCEF-627C (627 Carbon black dust collector)	**(Proposed)**
B-DCEF-627P (627 Pigment dust collector)	**(Proposed)**
B-DCEF-328C (328 Carbon black dust collector)	**(Proposed)**
B-DCEF-329C (329 Carbon black dust collector)	**(Proposed)**

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** B (89-0077-05) - Rubber Mixing and Milling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): B-DCEF-626C (626 carbon dust collector)	
4. Stack height above grade in feet: 105	
5. Velocity (data at exit conditions): 62.6 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.3
7. Exhaust flow rate at exit conditions (ACFM): 32,100	8. Flow rate at standard conditions (DSCFM): 31,659
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Emission source (identify):**
B (89-0077-05) - Rubber Mixing and Milling

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
B-DCEF-626CL (626 Clay dust collector)

4. Stack height above grade in feet:
105

5. Velocity (data at exit conditions):
75.7 (Actual feet per second)

6. Inside dimensions at outlet in feet:
3

7. Exhaust flow rate at exit conditions (ACFM):
32,100

8. Flow rate at standard conditions (DSCFM):
31,659

9. Exhaust temperature:
70 Degrees Fahrenheit (°F)

10. Moisture content (data at exit conditions):
1 Percent
5.01 Grains per dry standard cubic foot (gr./dscf.)

11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only):
N/A (°F)

12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)?
N/A

Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.

BYPASS STACK DESCRIPTION

13. Do you have a bypass stack?
_______ Yes XX No

If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Emission source (identify):**
B (89-0077-05) - Rubber Mixing and Milling

STACK DESCRIPTION

3. Stack ID (or flow diagram point identification):
B-DCEF-627C (627 carbon dust collector)

4. Stack height above grade in feet:
105

5. Velocity (data at exit conditions): 62.6 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.3
7. Exhaust flow rate at exit conditions (ACFM): 32,100	8. Flow rate at standard conditions (DSCFM): 31,659
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)

11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only):
N/A (°F)

12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)?
N/A

Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.

BYPASS STACK DESCRIPTION

13. Do you have a bypass stack?
________ Yes   XX No

If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** B (89-0077-05) - Rubber Mixing and Milling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): B-DCEF-627P (627 Pigment dust collector)	
4. Stack height above grade in feet: 105	
5. Velocity (data at exit conditions): 75.7 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3
7. Exhaust flow rate at exit conditions (ACFM): 32,100	8. Flow rate at standard conditions (DSCFM): 31,659
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** B (89-0077-05) - Rubber Mixing and Milling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): B-DCEF-328C (328 carbon dust collector)	
4. Stack height above grade in feet: 105	
5. Velocity (data at exit conditions): 62.6 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.3
7. Exhaust flow rate at exit conditions (ACFM): 32,100	8. Flow rate at standard conditions (DSCFM): 31,659
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** B (89-0077-05) - Rubber Mixing and Milling	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): B-DCEF-329C (329 Carbon dust collector)	
4. Stack height above grade in feet: 105	
5. Velocity (data at exit conditions): 62.6 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.3
7. Exhaust flow rate at exit conditions (ACFM): 32,100	8. Flow rate at standard conditions (DSCFM): 31,659
9. Exhaust temperature: 70 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 1 Percent; 5.01 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ________ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification(s):
B-DCEF-626C (626 carbon black dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?

Yes ☐ No ☑

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification (s):
B-DCEF-626CL (626 Clay dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?

Yes [ ] No [✔]

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify): B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification (s): B-DCEF-627C (627 carbon black dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available): N/A

6. Year of installation: 2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?

Yes ☐ No ☑

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification (s):
B-DCEF-627P (627 Pigment dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?

Yes ☐ No ☑

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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APC 18

TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify): B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification (s): B-DCEF-328C (328 carbon black dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available): N/A

6. Year of installation: 2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material? Yes [ ] No [✔]

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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TITLE V PERMIT APPLICATION
CONTROL EQUIPMENT - BAGHOUSES/FABRIC FILTERS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Emission source (identify):
B (89-0077-05) Rubber Mixing and Milling

3. Stack ID or flow diagram point identification (s):
B-DCEF-329C (329 carbon black dust collector)

BAGHOUSE/FABRIC FILTER DESCRIPTION

4. Describe the device in use. List the key operating parameters of this device and their normal operating range.

Dust collector used for raw material recovery. Pressure drop monitored - normal range 0.5" minimum to 6.0"

5. Manufacturer and model number (if available):
N/A

6. Year of installation:
2023

7. List of pollutant(s) to be controlled and the expected control efficiency for each pollutant (see instructions).

Pollutant	Efficiency (%)	Source of data
Particulate Matter	99	Vendor Guarantee

8. Discuss how collected material is handled for reuse or disposal.
Collected material is reused or sent off-site for disposal.

9. If the bags are coated, specify the material used for coating and frequency of coating
N/A

10. Does the baghouse collect asbestos containing material?

Yes ☐ No ☑

If "Yes", provide data as outlined in Item 10, Instructions for this form.

11. If this control equipment is in series with some other control equipment, state and specify the overall efficiency.
N/A

12. Page number: Revision Number: Date of Revision:

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APC 19

TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant
2. Process emission source, fuel burning installation, or incinerator (identify): B (89-0077-05) - Rubber Mixing and Milling
3. Stack ID or flow diagram point identification(s): See Attachment 10.2-A

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- [ ] Continuous Emission Monitoring (CEM) - APC 20
  Pollutant(s): ______
- [ ] Emission Monitoring Using Portable Monitors - APC 21
  Pollutant(s): ______
- [ ] Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
  Pollutant(s): ______
- [x] Monitoring Maintenance Procedures - APC 23
  Pollutant(s): Particulate matter
- [ ] Stack Testing - APC 24
  Pollutant(s): ______
- [ ] Fuel Sampling & Analysis (FSA) - APC 25
  Pollutant(s): ______
- [x] Recordkeeping - APC 26
  Pollutant(s): VOC and HAP
- [ ] Other (please describe) - APC 27
  Pollutant(s): ______

5. Compliance certification reports will be submitted to the Division according to the following schedule:
   Start date: One year after permit issuance
   And every 365 days thereafter.
6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
   Start date: Six months after permit issuance
   And every 180 days thereafter.
7. Page number: Revision number: Date of revision:

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APC 23

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY MONITORING MAINTENANCE PROCEDURES

The monitoring of a maintenance procedure shall be acceptable as a compliance demonstration method provided that a correlation between the procedure and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
   Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Stack ID or flow diagram point identification(s):
   See Attachment 10.2-A

3. Emission source (identify):
   B (89-0077-05) - Rubber Mixing and Milling

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:
   Particulate matter

5. Procedure being monitored:
   Dust collector inspection and maintenance

6. Description of the method of monitoring and establishment of correlation between the procedure and the emission rate of a particular pollutant:

Dust collector emissions are guaranteed by the vendor at 99+%. Proper upkeep of the dust collectors will, therefore, yield a control efficiency commensurate with the vendor's guarantee. Quarterly inspections of the dust collector are currently being conducted and maintenance will be performed as required. Compliance has been achieved during the previous permit term using this method.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
   Quarterly

8. Page number: Revision number: Date of revision:

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APC 26

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Stack ID or flow diagram point identification(s):
See attachment APC10.2-A

3. Emission source (identify):
B (89-0077-05) - Rubber Mixing and Milling

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:
VOC and HAP

5. Material or parameter being monitored and recorded:
Rubber processed and rubber type used

6. Method of monitoring and recording:

VOC and HAP Emission Rate
Monthly quantities of rubber processed through each affected equipment will be recorded. VOC and HAP emissions resulting from processing the rubber will be calculated using AP-42 emission factors developed by the Rubber Manufacturing Association. Compliance with the allowable limit will be based on a 12-month rolling period.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
12 month rolling sum for VOC and HAP allowable emission rate.

8. Page number: Revision number: Date of revision:

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APC 28

TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Stack ID or flow diagram point identification(s):
Bridgestone Americas Tire Operations, LLC, Warren Plant	See Attachment 10.2-A

3. Process emission source / Fuel burning installation / Incinerator (identify):
B (89-0077-05) - Rubber Mixing and Milling

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Particulate Matter (TSP)	11.32		11.32	
(Fugitive Emissions)	N/A		N/A	
Sulfur Dioxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Volatile Organic Compounds	180.62		180.62	
(Fugitive Emissions)	N/A		N/A	
Carbon Monoxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Lead	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Nitrogen Oxides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Total Reduced Sulfur	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Mercury	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Asbestos	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Beryllium	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Vinyl Chloride	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Gaseous Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Greenhouse Gases in CO_2 Equivalents	N/A		N/A	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Facility-Wide HAP Limit	9.9 (Single HAP)		9.9 (Single HAP)	
Facility-Wide HAP Limit	24.9 (Total HAP)		24.9 (Total HAP)	

6. Page number: Revision number: Date of revision

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APC 30

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION					
1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant			2. Emission source number B (89-0077-05)		
3. Describe the process emission source / fuel burning installation / incinerator. B (89-0077-05) - Rubber Mixing and Milling					
EMISSIONS AND REQUIREMENTS					
4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
See Attachment 10.2-A	Particulate	1200-3-7-.01(5)	Previous Permit Limit		
ALL UNITS COMBINED	Particulate	1200-3-7-.01(5)	25.5 lbs/hr		In
ALL UNITS COMBINED	Particulate	1200-3-7-.01(5)	Limit to avoid PSD		
			38.0 lb/hr & 11.32 Tons/Year	38.0 lb/hr & 11.32 Tons/Year	In
	Opacity	1200-3-5-.01(3)	10% (6 min. avg)	10%	In
Facility-Wide	VOC	1200-3-7-.07(2)	553.8 tpy	553.8 tpy	In
Facility-Wide	HAP (indiv.)		9.9 tpy	9.9 tpy	In
Facility-Wide	HAP (total)		24.9 tpy	24.9 tpy	In
10. Other applicable requirements (new requirements that apply to this source during the term of this permit)					
N/A					
11. Page number:		Revision number:		Date of revision:	

FUTURE ACTUAL PM EMISSIONS
Bridgestone Americas Tire Operations, Inc.
Warren County Plant

[redacted]

Source	Point Number	Pollutant	Emission Factor (lb PM / lb Matl)	Material Handled Potential (lb/hr)	Material Handled Potential (lb/yr)	PM_{Total} (a) (lb/hr)	PM_{Total} (a) (tpy)	PM_{10} (b) (lb/hr)	PM_{10} (b) (tpy)	$PM_{2.5}$ (c) (lb/hr)	$PM_{2.5}$ (c) (tpy)
Railcar and Trailer Unloading, Storage, and Holding (89-0077-02)	CB-RRBH-001	PM	[redacted]			0.03	0.03	0.03	0.03	0.01	0.01
	CB-RRBH-002	PM				0.13	0.11	0.13	0.11	0.03	0.03
	CB-RRBH-003	PM				0.13	0.11	0.13	0.11	0.03	0.03
	CB-STEF-001 to CB-STEF-020	PM				0.18	0.16	0.18	0.16	0.04	0.04
	CB-621V-001 to CB-621V-010 & CB-623V-001 to CB-623-V-010	PM				0.24	0.21	0.24	0.21	0.05	0.05
	CLAY001	PM				0.05	0.0014	0.05	0.0014	0.01	0.0003
	B-DCEF-FP1	PM				1.57	0.57	1.57	0.57	0.36	0.13
	B-DCEF-FP2	PM				1.57	0.57	1.57	0.57	0.36	0.13
TOTAL						**3.90**	**1.78**	**3.90**	**1.78**	**0.90**	**0.41**
Rubber Mixing and Milling (89-0077-05)	B-DCEF-621-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-623-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-624-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-625-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-621-P	PM				2.71	1.25	2.71	1.25	0.62	0.29
	B-DCEF-622-P	PM				2.71	1.25	2.71	1.25	0.62	0.29
	B-DCEF-623-P	PM				2.71	1.25	2.71	1.25	0.62	0.29
	B-DCEF-625-CL	PM				2.71	0.09	2.71	0.09	0.62	0.02
	B-DCEF-626-CL	PM				2.71	0.09	2.71	0.09	0.62	0.02
	B-DCEF-626-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-627-C	PM				2.71	0.62	2.71	0.62	0.62	0.14
	B-DCEF-627-P	PM				2.71	1.25	2.71	1.25	0.62	0.29
	B-DCEF-328-C	PM				2.71	1.23	2.71	1.23	0.62	0.28
	B-DCEF-329-C	PM				2.71	1.23	2.71	1.23	0.62	0.28
TOTAL						**37.99**	**11.32**	**37.99**	**11.32**	**8.74**	**2.60**

(a) Example Calculation: PM1PM_{Total} (lb/hr) = Material Handled (lb/hr) x Dust to Dust Collector (%) x (100% - Control Efficiency (%))
(b) PM_{10} = PM_{Total} (Conservative Assumption)
(c) $PM_{2.5}$ estimated using an assumed 23% of total particulate. The particle distribution was taken from Appendix B-2, Generalized Particle Size Distributions, of AP-42.

Bridgestone Americas Tire Operations, LLC
Warren Plant

PM Emission Factor Development

Source	Stack I.D.	Source Description	Temp. deg. F	Temp deg. R	Moisture %	Flow Rate Actual CFM	Flow Rate DSCFM	PM Emissions (lb/hr)	Max Throughput (lb/hr)	Emission Factor (lb PM / lb Matl)	
								0.01 gr/dscf			
-02	CB-RRBH-001	Rail Unloading Baghouse	70	530	1	400	395	0.034	[redacted]	[redacted]	
-02	CB-RRBH-002	Rail Unloading Baghouse	70	530	1	1,500	1,479	0.127	[redacted]	[redacted]	
-02	CB-RRBH-003	Rail Unloading Baghouse	70	530	1	1,500	1,479	0.127	[redacted]	[redacted]	
-02	CB-STEF	Silo Exhaust (Pre-Expansion)	70	530	1	700	690	0.118	[redacted]	[redacted]	Two Silos can be loaded at a time
-02	CB-STEF	Silo Exhaust (Post-Expansion)	70	530	1	700	690	0.178	[redacted]	[redacted]	Three Silos can be loaded at a time
-02	CB-621V & CB-623V	BB Day Bin Vents	70	530	1	700	690	0.237	[redacted]	[redacted]	Four bins can be loaded at one time.
-02	B-DCEF-FP	Fin. Pigment Dust Coll.	70	530	1	18,600	18,345	1.572	[redacted]	[redacted]	
-02	CLAY-001	Clay Silo Bin Vent	70	530	1	650	641	0.055	[redacted]	[redacted]	
-05	B-DCEF-P	Pigment Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-CL	Clay Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-C	Carbon Dust Coll.	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	
-05	B-DCEF-C (Tandem)	Carbon Dust Coll.(Tandem)	70	530	1	32,100	31,659	2.714	[redacted]	[redacted]	

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Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-05)

Banbury Area VOC Emissions

Calculation methodology:

VOC Emissions (tons/month) = Material Processed (lbs/month) x RMA Emission Factor (lb VOC/lb Material Processed) /2000

EXAMPLE BANBURY MATERIAL PROCESSING MONTHLY LOG VOCs (89-0077-05) Month Year

	*Material Processed lb./mo.	RMA EF lb. VOC/ lb. Material Processed	VOC Emissions ton/mo.	
Process				
Banbury		[redacted]		
Banbury Remill				
Total Banbury VOC emissions				

*Material Processed means all material used in preparation of rubber at the Banbury Mixers

Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-05)

Banbury Area HAP Emissions

<u>Calculation methodology:</u>

HAP Emissions (tons/month) = Banbury Material Processed (lbs/month) x RMA Emission Factor for each HAP (lb HAP/lb Material Processed-Banbury) / 2000 + Banbury Remill Material Processed (lbs/month) x RMA Emission Factor for each HAP (lb HAP/lb Material Processed-Banbury Remill) / 2000

EXAMPLE BANBURY MATERIAL PROCESSING
MONTHLY LOG HAPs (89-0077-05)

			Month	Year	
	*Material Processed lb./mo.	RMA EF lb. HAP/ lb. Material Processed (Banbury)	RMA EF lb. HAP/ lb. Material Processed (Banbury Remill)	HAP Emissions ton/mo.	
Process					
Banbury					
Banbury Remill					
HAPs					
1,1,1-Trichloroethane		[redacted]			
1,1-Dichloroethene					
1,3-Butadiene					
1,4-Dichlorobenzene					
2-Methylphenol					
4-Methyl-2-Pentanone					
Acetaldehyde					
Acetophenone					
Aniline					
Benzene					
Biphenyl					
bis(2-Ethylhexyl)phthalate					
Bromoform					
Cadmium (Cd)					
Carbon Disulfide					
Carbon Tetrachloride					
Chloromethane					
Chromium (Cr) Compounds					
Cumene					
Di-n-butylphthalate					
Dibenzofuran					

Dimethylphthalate	[redacted]		
Ethylbenzene	[redacted]		
Hexane	[redacted]		
Hydroquinone	[redacted]		
Isooctane	[redacted]		
Isophorone	[redacted]		
Lead (Pb) Compounds	[redacted]		
m-Xylene + p-Xylene	[redacted]		
Methylene Chloride	[redacted]		
Naphthalene	[redacted]		
Nickel (Ni) Compounds	[redacted]		
o-Xylene	[redacted]		
Phenol	[redacted]		
Styrene	[redacted]		
Tetrachloroethene	[redacted]		
Toluene	[redacted]		

*Material Processed means all material used in preparatio ixers

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

POWER HOUSE

PROCESS EMISSION SOURCE: 89-0077-10

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Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 4

TITLE V PERMIT APPLICATION
FUEL BURNING NON-PROCESS EQUIPMENT

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC - Warren Plant

2. **Stack ID or flow diagram point identification (s):**
PH-BEF-001, PH-BEF-002, PH-BEF-003, and PH-HHEF-001

FUEL BURNING EQUIPMENT DESCRIPTION

3. List all fuel burning equipment that is at this fuel burning installation (please complete an APC 4 form for each piece of fuel burning equipment).

PH (89-0077-10), Power House
These equipment will burn natural gas only, except during periods of gas curtailment, gas supply interruption, startups, or periodic testing on liquid fuel. During these periods, No. 2 fuel oil will be fired.

4. Fuel burning equipment identification number:

5. Fuel burning equipment description:

Three boilers - 75 mmBTU/hr each
One hydronic heater - 10.3 mmBTU/hr

6. Year of installation or last modification of fuel burning equipment.
2010 - Removal of 3 Hitachi Hydronic Heaters (Minor Mod #2 - 2011)

7. Furnace type:
N/A

8. Manufacturer model number (if available):
Babcox and Wilcox boiler
Hitachi hydronic heater/chiller

9. Location of this fuel burning installation in UTM coordinates: UTM Vertical: 601.750 UTM Horizontal: 3943.518

10. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.

FUELS, CONTROLS, AND MONITORING DESCRIPTION

11. Maximum rated heat input capacity (in million BTU/Hour)
235.3

12. If wood is used as a fuel, specify the amount of wood used as a fraction of total heat input.

13. Fuels:	Primary fuel	Backup fuel #1	Backup fuel #2	Backup fuel #3
Fuel name	Natural Gas	#2 Fuel Oil		
Actual yearly consumption	2,020.8 MMCF/Year	7,339,364 GAL/Year		

14. If emissions from this fuel burning equipment are controlled for compliance, please specify the type of control:
N/A

15. If emissions from this fuel burning equipment are monitored for compliance, please specify the type of monitoring:
N/A

16. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, material handling operations, etc. (please attach a separate sheet if necessary).
N/A

17. Page number: Revision Number: Date of Revision:

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Department of Environment and Conservation
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APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** PH (89-0077-10) - Power House	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): PH-BEF-003 (boiler #3 exhaust)	
4. Stack height above grade in feet: 49.5	
5. Velocity (data at exit conditions): 37.8 (Actual feet per second)	6. Inside dimensions at outlet in feet: 3.5
7. Exhaust flow rate at exit conditions (ACFM): 21,800	8. Flow rate at standard conditions (DSCFM): 16,454
9. Exhaust temperature: 150 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 12.8 Percent; N/A Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ______ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

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APC 19

TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant
2. Process emission source, fuel burning installation, or incinerator (identify): PH (89-0077-10), Power House
3. Stack ID or flow diagram point identification(s): PH-BEF-001 through -003, and PH-HHEF-001

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- [ ] Continuous Emission Monitoring (CEM) - APC 20
  Pollutant(s): ______
- [ ] Emission Monitoring Using Portable Monitors - APC 21
  Pollutant(s): ______
- [ ] Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
  Pollutant(s): ______
- [ ] Monitoring Maintenance Procedures - APC 23
  Pollutant(s): ______
- [ ] Stack Testing - APC 24
  Pollutant(s): ______
- [x] Fuel Sampling & Analysis (FSA) - APC 25
  Pollutant(s): % Sulfur for fuel oil
- [x] Recordkeeping - APC 26
  Pollutant(s): Particulate matter, VOC, sulfur dioxide, nitrogen oxides
- [ ] Other (please describe) - APC 27
  Pollutant(s): ______

5. Compliance certification reports will be submitted to the Division according to the following schedule:
   Start date: One year after permit issuance
   And every 365 days thereafter.
6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
   Start date: Six months after permit issuance
   And every 180 days thereafter.
7. Page number: Revision number: Date of revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
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APC 25

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY FUEL SAMPLING AND ANALYSIS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC - Warren Plant	2. Stack ID or flow diagram point identification(s): PH-BEF-001 through -003, and PH-HHEF-001

3. Emission source (identify):
PH (89-0077-10), Power House

MONITORING THROUGH FUEL SAMPLING AND ANALYSIS

4. Pollutant(s) being monitored:
Sulfur dioxide via sulfur content in fuel

5. Fuel being sampled:
#2 Fuel Oil

6. List the fuel sample collecting and analyzing method used (if an ASTM method is not applicable, propose a method acceptable to the Technical Secretary).

Sample collection and analysis is performed in accordance with 40 CFR 60.44c(h), Subpart Dc by the supplier or the plant.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
Fuel supplier certification shall include either the sulfur content by weight percent of each shipment of fuel oil or a statement from each oil supplier that all oil provided to the company complies with the allowable sulfur content limit.

8. Page number:	Revision number:	Date of revision:

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APC 26

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Stack ID or flow diagram point identification(s): PH-BEF-001 through -003, and PH-HHEF-001

3. Emission source (identify):

PH (89-0077-10), Power House

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:

Particulate matter, sulfur dioxide, No.2 fuel oil combustion

5. Material or parameter being monitored and recorded:

Fuel usage

6. Method of monitoring and recording:

Particulate Matter and Sulfur Dioxide - lb/mmBTU
-No monitoring or recordkeeping required because compliance with the limit is based on total heat input capacity and the particulate matter and sulfur dioxide AP-42 emission factors. Both the heat input capacity and AP-42 emission factors are constants meaning the lb/mmBTU will also be a constant less than or equal to the allowable lb/mmBTU particulate matter and sulfur dioxide limits.

Sulfur Dioxide - ton/yr
-Monthly emissions will be calculated using monthly fuel usage and AP-42 emission factors; compliance will be demonstrated based on a 12-month rolling period.

No.2 Fuel Oil Combustion
-Monthly recording keeping of No.2 Fuel Oil combustion will be used to maintain a 12-month rolling average to demonstrate compliance with the limit of 7,339,364 gal. per 12-month period.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

Monthly

8. Page number:	Revision number:	Date of revision:

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APC 28

TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Stack ID or flow diagram point identification(s):
PH-BEF-001 through -003, and PH-HHEF-001

3. Process emission source / Fuel burning installation / Incinerator (identify):
PH (89-0077-10), Power House

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Particulate Matter (TSP)	15.96		N/A	
(Fugitive Emissions)	N/A		N/A	
Sulfur Dioxide	78.46		N/A	
(Fugitive Emissions)	N/A		N/A	
Volatile Organic Compounds	5.56		N/A	
(Fugitive Emissions)	N/A		N/A	
Carbon Monoxide	84.87		N/A	
(Fugitive Emissions)	N/A		N/A	
Lead	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Nitrogen Oxides	95.16		N/A	
(Fugitive Emissions)	N/A		N/A	
Total Reduced Sulfur	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Mercury	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Asbestos	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Beryllium	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Vinyl Chloride	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Gaseous Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Greenhouse Gases in CO_2 Equivalents	144,579		N/A	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)

6. Page number: Revision number: Date of revision

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APC 30

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source number PH (89-0077-10)
3. Describe the process emission source / fuel burning installation / incinerator. PH (89-0077-10), Power House	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Entire source	Sulfur Dioxide	1200-3-14-.01(3)	35.3 lbs/hr, 78.46 tpy		In
Entire source	Fuel Oil Sulfur Content	40 CFR 60, Subpart DC	0.15% sulfur		In
Entire source	Opacity	1200-3-5-01(1) (natural gas) 40 CFR 60, Subpart DC (No. 2 fuel oil)	20% (aggregate) for N.G. 20% (6 min. avg.) for No. 2		In
Entire source	Particulate Matter	1200-3-6-.03(2)	5.55 lb/hr, 16.0 tpy		In
Entire source	Nitrogen Oxides	1200-3-6-.03(2)	95.16 tpy		In
Entire source	VOC	1200-3-6-.03(2)	5.6 tpy		In
Entire source	Fuel Oil	1200-3-6-.03(2)	7,339,364 gal/yr		In
Entire source	Heat Input	1200-3-6-.03(2)	235.3 MMBtu/hr		In

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

N/A					

11. Page number: Revision number: Date of revision:

Bridgestone Americas Tire Operations, LLC
Warren Plant

Emission Source: 10
Two Babcock & Wilcox Boilers (75 MMBtu/hr, each)
One Hitachi Hydronic Heater (10.3 MMBtu/hr)

Operating Parameters

Fuel Type	Natural Gas		No. 2 Fuel Oil	
Babcock & Wilcox Boiler 1	75.0	MMBtu/hr		
Babcock & Wilcox Boiler 2	75.0	MMBtu/hr		
Hitaachi Hydronic Heater	10.3	MMBtu/hr		
Maximum Firing Rate	160.3	MMBtu/hr		
Operating Hours	8,760	hr/yr	4,367	hr/yr
Heat Content of Fuel	1,020	Btu/cf	140,000	Btu/gal
Fuel Consumption	157,157	cf/hr	1,145	gal/hr
	1376.69	MMcf/yr	5,000	1000 gal/yr

Emission Calculations

Emission Factors for Natural Gas Combustion [1,2]

Pollutant	lb/10^6 scf	lb/MMBtu-HHV	Source	
Particulate Matter (PM_{Total})	7.6	0.0075	AP-42 Table 1.4-2	
Nitrogen Oxides (NO_x)	50	0.0490	AP-42 Table 1.4-1	*(used for existing boilers)*
Nitrogen Oxides (NO_x)	100	0.0980	AP-42 Table 1.4-1	*(used for Hydronic Heater)*
Carbon Monoxide	84	0.0824	AP-42 Table 1.4-1	
Sulfur Dioxide (SO_2)	0.6	0.0006	AP-42 Table 1.4-2	
VOC	5.5	0.0054	AP-42 Table 1.4-2	
Carbon Dioxide (CO_2)		116.98	40 CFR 98, Table C-1	
Methane (CH_4)		0.0022	40 CFR 98, Table C-2	
Nitrous Oxide (N_2O)		0.0002	40 CFR 98, Table C-2	
Lead (Pb)	0.0005	--	AP-42 Table 1.4-2	

	Maximum [4] **lb/hr**	**Annual [5]** **ton/year**
Particulate Matter (PM_{Total})	1.19	5.23
Nitrogen Oxides (NO_x) from 2 Boilers	7.35	32.21
Nitrogen Oxides (NO_x) from 1 Heater	1.01	4.42
Carbon Monoxide	13.20	57.82
Sulfur Dioxide (SO_2)	0.094	0.41
Combustion VOC	0.86	3.79
Carbon Dioxide (CO_2)	18,751	82,131
Methane (CH_4)	0.35	1.55
Nitrous Oxide (N_2O)	0.04	0.15
CO_2 Equivalent (CO_2eq)[7,8]	--	82,215
Lead (Pb)	7.86E-05	3.44E-04

Emission Factors for No. 2 Fuel Oil Combustion [1,2]

	$lb/10^3$ gal	lb/MMBtu-HHV			
Particulate Matter (PM_{Total})	3.3	0.024	AP-42 Table 1.3-2		
Nitrogen Oxides (NO_x)	20	0.143	AP-42 Table 1.3-1		
Carbon Monoxide	5	0.036	AP-42 Table 1.3-1		
Sulfur Dioxide (SO_2)	21.3	0.152	AP-42 Table 1.3-1 (142S. S = Sulfur Content<	0.1500	%)
VOC	0.2	0.001	AP-42 Table 1.3-3		
Carbon Dioxide (CO_2)		163.05	40 CFR 98, Table C-1		
Methane (CH_4)		0.0066	40 CFR 98, Table C-2		
Nitrous Oxide (N_2O)		0.0013	40 CFR 98, Table C-2		
Lead (Pb)	1.3E-03	9.0E-06	AP-42 Table 1.3-10		

	Maximum [4] **lb/hr**	**Annual [5]** **ton/year**
Particulate Matter (PM_{Total})	3.78	8.25
Nitrogen Oxides (NO_x)	22.90	50.00
Carbon Monoxide	5.73	12.50
Sulfur Dioxide (SO_2)	24.39	53.25
Combustion VOC	0.23	0.50
Carbon Dioxide (CO_2)	26,137	57,068
Methane (CH_4)	1.06	2.31
Nitrous Oxide (N_2O)	0.21	0.46
CO_2 Equivalent (CO_2eq)[7,8]	--	57,264
Lead (Pb)	1.44E-03	3.15E-03

Summary of Emissions[6]

	Maximum [4] **lb/hr**	**Annual [5]** **ton/year**
Particulate Matter (PM_{Total})	3.78	10.87
Particulate Matter (PM_{10})	3.78	10.87
Particulate Matter ($PM_{2.5}$)	3.78	10.87
Nitrogen Oxides (NO_x)	22.90	68.37
Carbon Monoxide	13.20	57.82
Sulfur Dioxide (SO_2)	24.39	53.46
Combustion VOC	0.86	3.79
Carbon Dioxide (CO_2)	26,137	98,257
Methane (CH_4)	1.06	3.09
Nitrous Oxide (N_2O)	0.21	0.54
CO_2 Equivalent (CO_2eq)[7,8]	--	98,496
Lead (Pb)	1.44E-03	3.32E-03

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Sections 1.3 and 1.4, July 1998, Small Boilers < 100 MMBtu/hr

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020.

(3) Assume PM= $PM_{2.5}$, PM_{10}

(4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Firing Rate (MMBtu/hr)

(5) Annual Emissions (tpy) = Annual Fuel Usage (MMCF or 1000 gal) * Emission Factor (lb/MMCF or lb/1000 gal) / 2,000 (lb/ton)

(6) Summary of Emissions: Hourly and Daily emissions are the worst case (NG vs Fuel Oil).
Annual Emissions = Natural gas emissions + fuel oil emissions

(7) CO_2 Equivalent (CO_2eq) = CO_2 + [GWP_{CH4} * CH_4] + [GWP_{N2O} * N_2O]

(8) GWP_{CH4} = 25, GWP_{N2O} = 298; 40 CFR 98 Table A-1

Bridgestone Americas Tire Operations, LLC
Warren Plant

Emission Source: 10
One Babcock & Wilcox Boilers (75 MMBtu/hr) **Proposed Boiler**

Operating Parameters

Fuel Type	Natural Gas		No. 2 Fuel Oil	
Maximum Firing Rate	75.0	MMBtu/hr		
Operating Hours	8,760	hr/yr	4,367	hr/yr
Heat Content of Fuel	1,020	Btu/cf	140,000	Btu/gal
Fuel Consumption	73,529	cf/hr	536	gal/hr
	644.12	MMcf/yr	2,339	1000 gal/yr

Emission Calculations

Emission Factors for Natural Gas Combustion [1,2]

Pollutant	lb/10^6 scf	lb/MMBtu-HHV	Source
Particulate Matter (PM_{Total})	7.6	0.0075	AP-42 Table 1.4-2
Nitrogen Oxides (NO_x)	50	0.0490	AP-42 Table 1.4-1 (Low-NOx Technology)
Carbon Monoxide	84	0.0824	AP-42 Table 1.4-1
Sulfur Dioxide (SO_2)	0.6	0.0006	AP-42 Table 1.4-2
VOC	5.5	0.0054	AP-42 Table 1.4-2
Carbon Dioxide (CO_2)		116.98	40 CFR 98, Table C-1
Methane (CH_4)		0.0022	40 CFR 98, Table C-2
Nitrous Oxide (N_2O)		0.0002	40 CFR 98, Table C-2
Lead (Pb)	0.0005	--	AP-42 Table 1.4-2

	Maximum [4] lb/hr	**Annual [5] ton/year**
Particulate Matter (PM_{Total})	0.56	2.45
Nitrogen Oxides (NO_x)	3.68	16.10
Carbon Monoxide	6.18	27.05
Sulfur Dioxide (SO_2)	0.044	0.19
Combustion VOC	0.40	1.77
Carbon Dioxide (CO_2)	8,773	38,427
Methane (CH_4)	0.17	0.72
Nitrous Oxide (N_2O)	0.02	0.07
CO_2 Equivalent (CO_2eq)[7,8]	--	38,466
Lead (Pb)	3.68E-05	1.61E-04

Emission Factors for No. 2 Fuel Oil Combustion [1,2]

	$lb/10^3$ gal	lb/MMBtu-HHV	
Particulate Matter (PM_{Total})	3.3	0.024	AP-42 Table 1.3-2
Nitrogen Oxides (NO_x)	16	0.114	AP-42 Table 1.3-1
Carbon Monoxide	5	0.036	AP-42 Table 1.3-1
Sulfur Dioxide (SO_2)	21.3	0.152	AP-42 Table 1.3-1 (142S. S = Sulfur Content< 0.1500 %)
VOC	0.2	0.001	AP-42 Table 1.3-3
Carbon Dioxide (CO_2)		163.05	40 CFR 98, Table C-1
Methane (CH_4)		0.0066	40 CFR 98, Table C-2
Nitrous Oxide (N_2O)		0.0013	40 CFR 98, Table C-2
Lead (Pb)	1.3E-03	9.0E-06	AP-42 Table 1.3-10

	Maximum [4] **lb/hr**	**Annual** [5] **ton/year**
Particulate Matter (PM_{Total})	1.77	3.86
Nitrogen Oxides (NO_x)	8.57	18.71
Carbon Monoxide	2.68	5.85
Sulfur Dioxide (SO_2)	11.41	24.91
Combustion VOC	0.11	0.23
Carbon Dioxide (CO_2)	12,229	26,701
Methane (CH_4)	0.50	1.08
Nitrous Oxide (N_2O)	0.10	0.22
CO_2 Equivalent (CO_2eq)[7,8]	--	26,792.32
Lead (Pb)	6.75E-04	1.47E-03

Summary of Emissions[6]

	Maximum [4] **lb/hr**	**Annual** [5] **ton/year**
Particulate Matter (PM_{Total})	1.77	5.09
Particulate Matter (PM_{10})	1.77	5.09
Particulate Matter ($PM_{2.5}$)	1.77	5.09
Nitrogen Oxides (NO_x)	8.57	26.79
Carbon Monoxide	6.18	27.05
Sulfur Dioxide (SO_2)	11.41	25.01
Combustion VOC	0.40	1.77
Carbon Dioxide (CO_2)	12,229	45,972
Methane (CH_4)	0.50	1.45
Nitrous Oxide (N_2O)	0.10	0.25
CO_2 Equivalent (CO_2eq)[7,8]	--	46,083
Lead (Pb)	6.75E-04	1.55E-03

Example Calculations/Notes:

(1) Compilation of Air Pollutant Emission Factors, AP-42, Supplement D, Fifth Edition, Sections 1.3 and 1.4, July 1998, Small Boilers < 100 MMBtu/hr

(2) Per AP-42, Table 1.4-1 and 1.4-2, to convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020.

(3) Assume PM= $PM_{2.5}$, PM_{10}

(4) Maximum Emissions (lb/hr) = Emission Factor (lb/MMBtu) * Maximum Firing Rate (MMBtu/hr)

(5) Annual Emissions (tpy) = Annual Fuel Usage (MMCF or 1000 gal) * Emission Factor (lb/MMCF or lb/1000 gal) / 2,000 (lb/ton)

(6) Summary of Emissions: Hourly and Daily emissions are the worst case (NG vs Fuel Oil).
Annual Emissions = Natural gas emissions + fuel oil emissions

(7) CO_2 Equivalent (CO_2eq) = CO_2 + [GWP_{CH4} * CH_4] + [GWP_{N2O} * N_2O]

(8) GWP_{CH4} = 25, GWP_{N2O} = 298; 40 CFR 98 Table A-1

Public Version - Trade Secret Information Redacted

1 Boiler

BRIDGESTONE TIRE MANUFACTURING
201-3094
SCOPE OF SUPPLY

NO. PER BOILER	FM10-70 BOILER WITH TRIM
1	Rectangualar finned tube economizer with sootblower & relief valve
1	CHX Condensing Heat Exchanger System
1	Non-Return Valve
1	Flues & Ducts & Dampers
1	Corten Steel Stack with Platform and Ladder
1	Forced Draft Fan with Inlet Silencer
1	F.D. Fan Motor Drive
1	F.D. Fan Turbine Drive
1	Kato Generator
1	Coen Low-Nox Burner & Controls
1	Miscellaneous Instrumentation
1	Feedwater Control (3-Element)
2	Diamond G9B Sootblowers for Boiler
1	Diamond G9B Sootblower for Economizer

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#2 Boilers

BRIDGESTONE/FIRESTONE, INC.
Morrison, TN 37357
B&W CONTRACT NO.: 201-3284

February 15, 1999

MANUAL CONTENTS

SCOPE OF SUPPLY/DESCRIPTION

One Babcock & Wilcox FM10-70 Boiler, left hand, with steam flow of 60,000 lbs/hr. Of saturated steam at a pressure of 260 PSIG when being supplied with feedwater at 240°F and when being fired with natural gas or No.2 fuel oil. Boiler design pressure is 400 PSIG. Scope includes: Coen DAF-26 multi-stage low Nox burner with fuel trains, BMS and Combustion Controls; Eco fin tube rectangular economizer; Clarage FD fan with generator; Warren 42" diameter, 50 feet high stack; boiler sootblower, economizer sootblower; various boiler trim.

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

TIRE CURING

PROCESS EMISSION SOURCE: 89-0077-22

Public Version - Trade Secret Information Redacted

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 10

TITLE V PERMIT APPLICATION
MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION

1. **Facility name:**
Bridgestone Americas Tire Operations, LLC, Warren Plant

2. **Process emission source (identify):**
C (89-0077-22) - Tire Curing

3. Stack ID or flow diagram point identification (s): CR-EF-301 through -310, -314 through -321, and -326 through -337

4. Year of construction or last modification: 2018

If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.

5. Normal operating schedule: 24 Hrs./Day 7 Days/Wk. 365 Days/Yr.

6. Location of this process emission source in UTM coordinates: UTM Vertical: 601222 UTM Horizontal: 3943481

7. Describe this process (Please attach a flow diagram of this process) and check one of the following:

[✔] Batch [ ] Continuous

PROCESS MATERIAL INPUT AND OUTPUT

8. List the types and amounts of raw materials input to this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Green Tire	Stored on skids and transported by forklift		[redacted]

9. List the types and amounts of primary products produced by this process:

Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Finished Tire	Stored on skids and transported by forklift	Varies	[redacted]

10. Process fuel usage:

Type of fuel	Max heat input (10^6 BTU/Hr.)	Average usage (units)	Maximum usage (units)
N/A	N/A		

11. List any solvents, cleaners, etc., associated with this process:
N/A

If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.

12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary).

13. Page number: Revision Number: Date of Revision:

Public Version - Trade Secret Information Redacted

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 3

TITLE V PERMIT APPLICATION
STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. **Facility name:** Bridgestone Americas Tire Operations, LLC, Warren Plant	
2. **Emission source (identify):** C (89-0077-22) - Tire Curing	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): CR-EF-301 through -310, -314 through -321, and -326 through -337 (30 identical stacks)	
4. Stack height above grade in feet: 37.5	
5. Velocity (data at exit conditions): 43.2 (Actual feet per second)	6. Inside dimensions at outlet in feet: 5 ft diameter
7. Exhaust flow rate at exit conditions (ACFM): 50,900	8. Flow rate at standard conditions (DSCFM): 46,487
9. Exhaust temperature: 100 Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): 3.5 Percent; 19.02 Grains per dry standard cubic foot (gr./dscf.)
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (for stacks subject to diffusion equation only): N/A (°F)	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO_2, NO_x, etc.)? N/A	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? ____ Yes XX No If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision:	

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
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Nashville, TN 37243
Telephone: (615) 532-0554

APC 19

TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant

2. Process emission source, fuel burning installation, or incinerator (identify): C (89-0077-22) - Tire Curing

3. Stack ID or flow diagram point identification(s): CR-EF-301 through -310, -314 through -321, and -326 through -337

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

- [ ] Continuous Emission Monitoring (CEM) - APC 20
  Pollutant(s): ______
- [ ] Emission Monitoring Using Portable Monitors - APC 21
  Pollutant(s): ______
- [ ] Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
  Pollutant(s): ______
- [ ] Monitoring Maintenance Procedures - APC 23
  Pollutant(s): ______
- [ ] Stack Testing - APC 24
  Pollutant(s): ______
- [ ] Fuel Sampling & Analysis (FSA) - APC 25
  Pollutant(s): ______
- [x] Recordkeeping - APC 26
  Pollutant(s): VOC and HAP
- [ ] Other (please describe) - APC 27
  Pollutant(s): ______

5. Compliance certification reports will be submitted to the Division according to the following schedule:
   Start date: One year after permit issuance
   And every 365 days thereafter.

6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
   Start date: Six months after permit issuance
   And every 180 days thereafter.

7. Page number: Revision number: Date of revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 26

TITLE V PERMIT APPLICATION
COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:	2. Stack ID or flow diagram point identification(s):
Bridgestone Americas Tire Operations, LLC, Warren Plant	CR-EF-301 through -310, -314 through -321, and -326 through -337

3. Emission source (identify):

C (89-0077-22) - Tire Curing

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored:

VOC and HAP

5. Material or parameter being monitored and recorded:

Rubber Cured

6. Method of monitoring and recording:

VOC and HAP Emission Rate

Monthly quantity of rubber cured will be recorded. VOC and HAP emissions resulting from curing will be calculated using emission factors developed by Bridgestone in 2005. Compliance with the allowable limit will be based on a 12-month rolling period.

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):

12 month rolling sum for VOC and HAP allowable emission rate.

8. Page number:	Revision number:	Date of revision:

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 28

TITLE V PERMIT APPLICATION
EMISSIONS FROM PROCESS EMISSION SOURCE / FUEL BURNING INSTALLATION / INCINERATOR

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Stack ID or flow diagram point identification(s): CR-EF-301 through -310, -314 through -321, and -326 through -337
3. Process emission source / Fuel burning installation / Incinerator (identify): C (89-0077-22) - Tire Curing	

EMISSIONS SUMMARY TABLE – CRITERIA AND FUGITIVE EMISSIONS

4. Complete the following emissions summary for regulated air pollutants. Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Particulate Matter (TSP)	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Sulfur Dioxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Volatile Organic Compounds	104.77		104.77	
(Fugitive Emissions)	N/A		N/A	
Carbon Monoxide	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Lead	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Nitrogen Oxides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Total Reduced Sulfur	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Mercury	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	

(Continued on next page)

(Continued from last page)

AIR POLLUTANT	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Asbestos	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Beryllium	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Vinyl Chloride	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Gaseous Fluorides	N/A		N/A	
(Fugitive Emissions)	N/A		N/A	
Greenhouse Gases in CO_2 Equivalents	N/A		N/A	

EMISSIONS SUMMARY TABLE – FUGITIVE HAZARDOUS AIR POLLUTANTS

5. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s). Fugitive emissions shall be included. Attach calculations and emission factor references.

Air Pollutant & CAS	Maximum Allowable Emissions		Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour - Item 7, APC 30)	Tons per Year	Reserved for State use (Pounds per Hour- Item 8, APC 30)
Facility-Wide HAP Limit	9.9 (Single HAP)		9.9 (Single HAP)	
Facility-Wide HAP Limit	24.9 (Total HAP)		24.9 (Total HAP)	

6. Page number: Revision number: Date of revision

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554

APC 30

TITLE V PERMIT APPLICATION
CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Bridgestone Americas Tire Operations, LLC, Warren Plant	2. Emission source number C (89-0077-22)
3. Describe the process emission source / fuel burning installation / incinerator. Tire Curing	

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Entire Section	VOC	1200-3-7-.07(2)	553.8 tpy	553.8 tpy	In
			(Facility Wide)	(Facility Wide)	
Entire Section	HAP (indiv.)		9.9 tpy	9.9 tpy	In
			(Facility Wide)	(Facility Wide)	
Entire Section	HAP (total)		24.9 tpy	24.9 tpy	In
			(Facility Wide)	(Facility Wide)	

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

N/A					

11. Page number: Revision number: Date of revision:

Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-22)

Tire Curing VOC Emissions

<u>Calculation methodology:</u>

VOC Emissions (tons/month) = Material Processed (lbs/month) x RMA Curing Emission Factor (lb VOC/lb Material Processed) / 2000

EXAMPLE CURING MATERIAL PROCESSING
MONTHLY LOG VOCs (89-0077-22)

Month Year

	*Material Processed lb./mo.	RMA EF lb. VOC/ lb. Material Processed	VOC Emissions ton/mo.	
Process				
Curing		[redacted]		
Total Curing VOC emissions				

*Material Processed means rubber component of tires cured

Bridgestone Americas Tire Operations, LLC
Warren Plant
Process Emission Source: (89-0077-22)

Curing Area HAP Emissions

Calculation methodology:

HAP Emissions (tons/month) = Curing Material Processed (lbs/month) x RMA Emission Factor for each HAP (lb HAP/lb Material Processed) / 2000

EXAMPLE CURING MATERIAL PROCESSING MONTHLY LOG HAPs (89-0077-22) Month Year

	*Material Processed lb./mo.	RMA EF lb. HAP/ lb. Material Processed	HAP Emissions ton/mo.	
Process				
Curing				
HAPs		[redacted]		
4-Methyl-2-Pentanone				
Carbon Disulfide				
m-Xylene + p-Xylene				
Hexane				
Benzene				
Toluene				
Chloromethane				
Aniline				
Cumene				
Phenol				
Di-n-butylphthalate				
Naphthalene				
1,2-Dibromo-3-Chloropropane				
Acetophenone				
Biphenyl				
bis(2-Ethylhexyl)phthalate				
Dimethylphthalate				
o-Toluidine				
2-Methylphenol				
Dibenzofuran				
Isophorone				
Acenaphthylene				
Fluoranthene				
Phenanthrene				
Pyrene				
2-Methylnaphthalene				
Diphenylamine				
TOTAL POM HAP				

*Material Processed means rubber component of tires cured

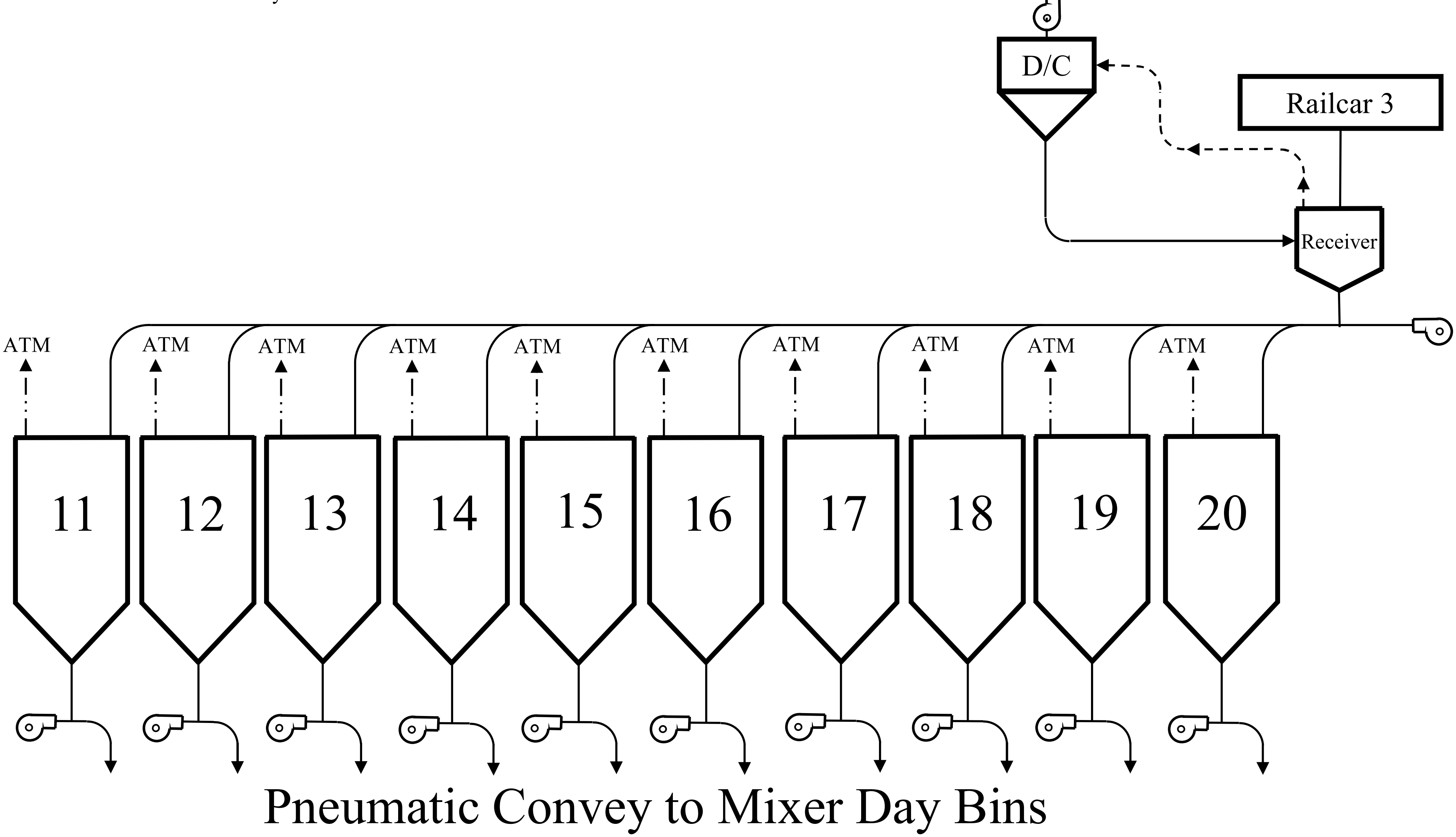
BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX E

PROCESS FLOW DIAGRAMS

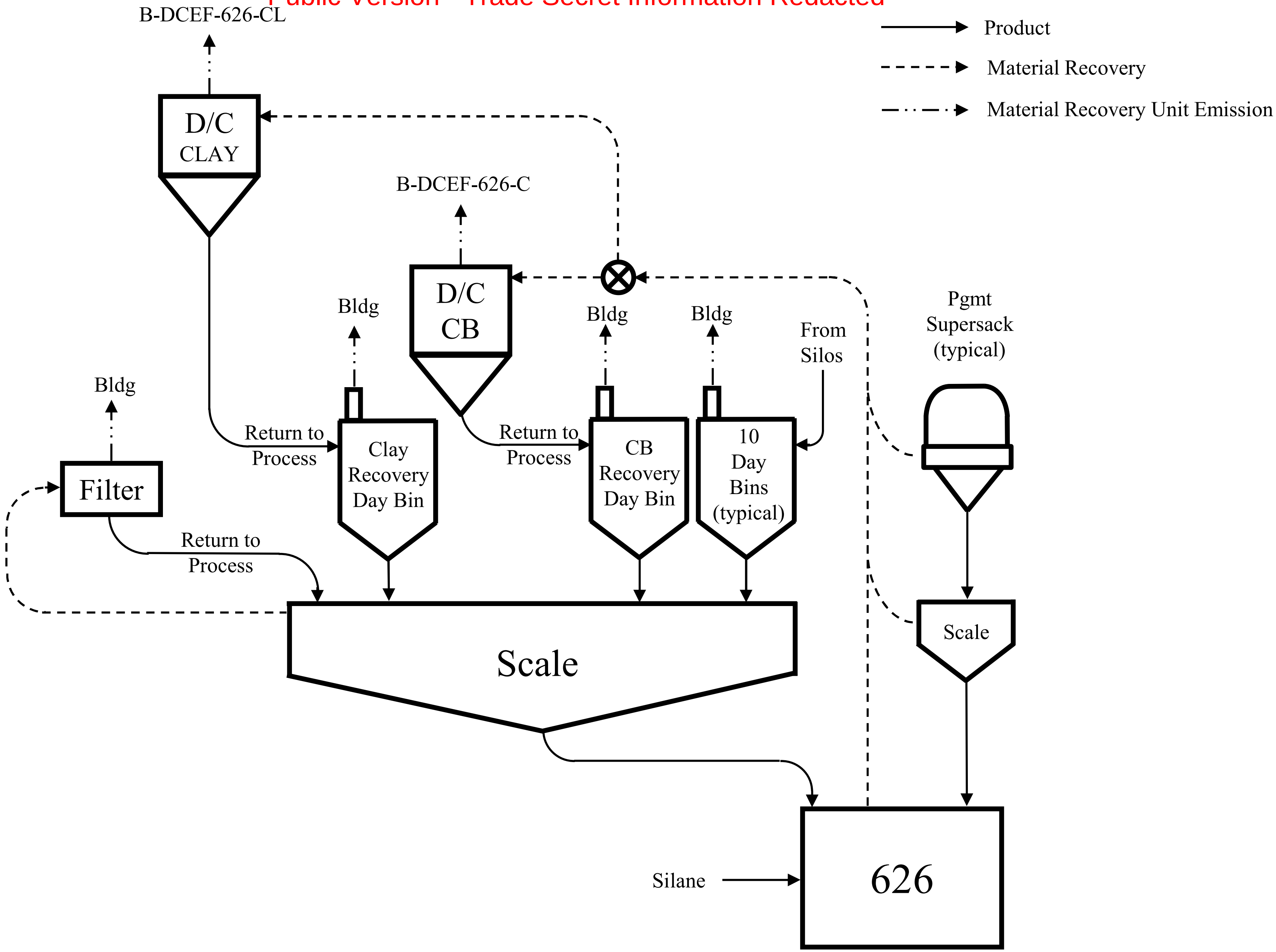
Public Version - Trade Secret Information Redacted

Silos (CB & Silica)
CB-STEF-011-020



STEVENSEHS CONSULTING	Bridgestone Americas Tire Operations, LLC Warren Plant	Carbon Black Silos 2023 Expansion

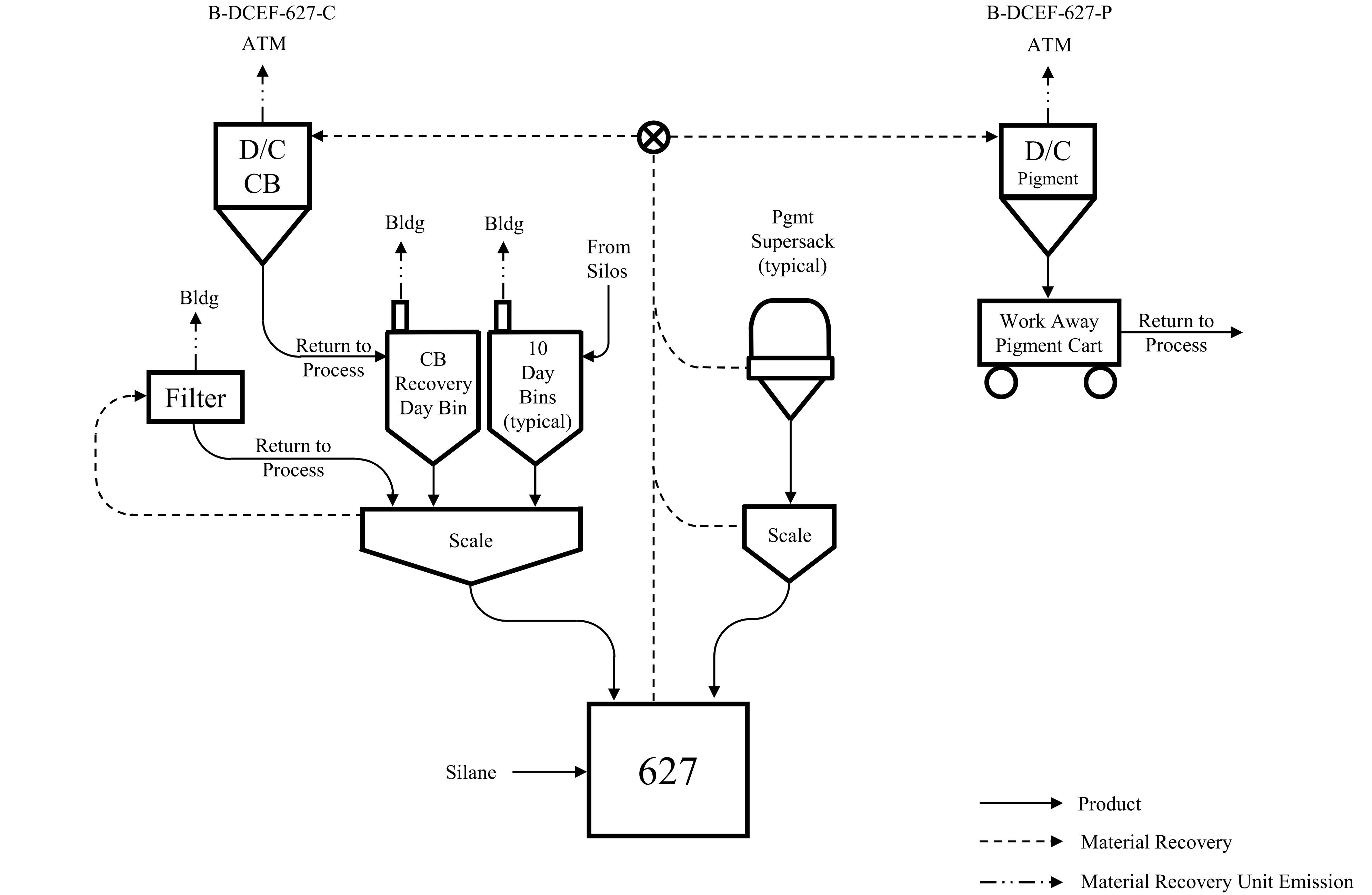
Public Version - Trade Secret Information Redacted



Bridgestone Americas Tire Operations, LLC

Warren Plant

Mixer 626
2023 Expansion

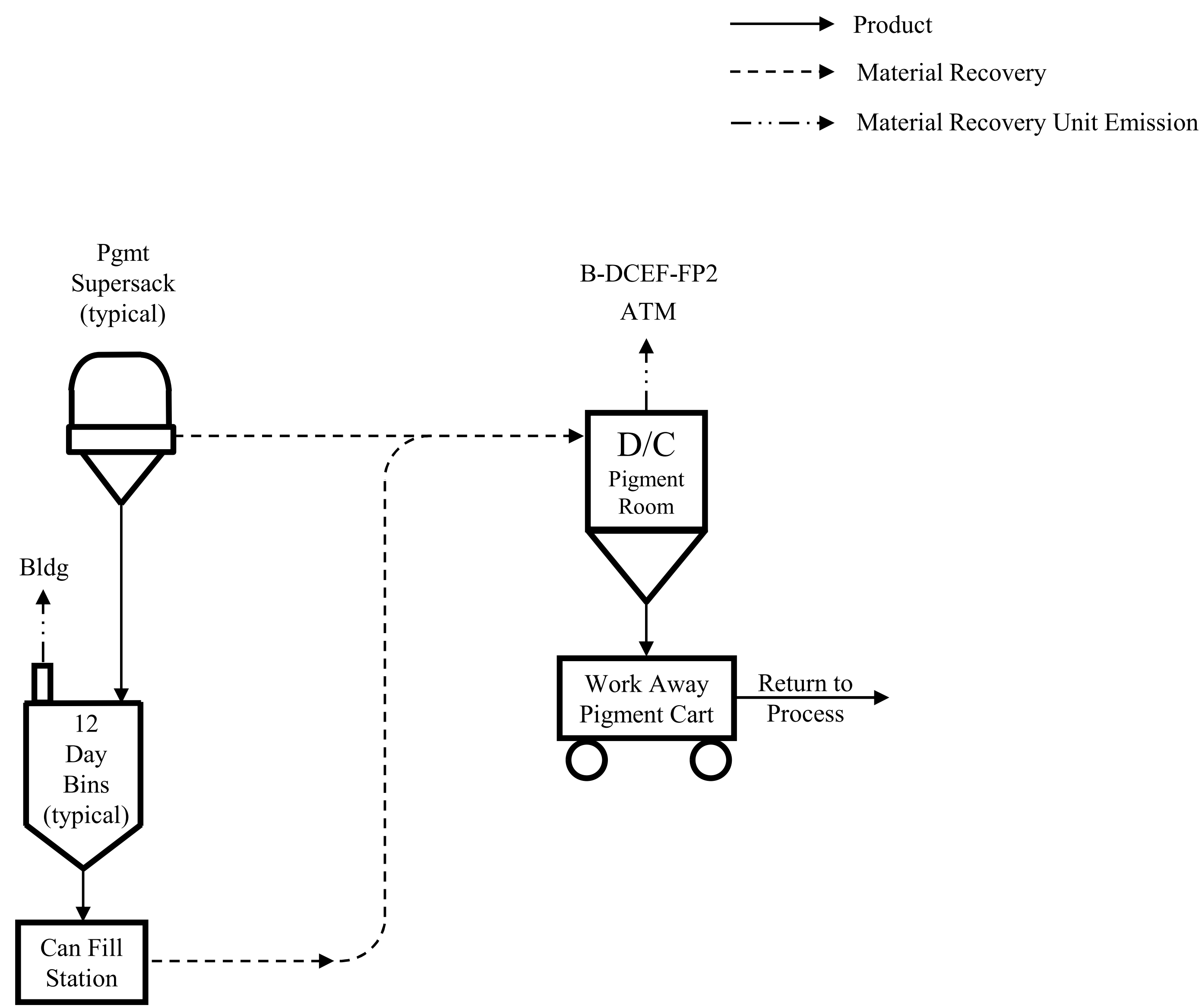


STEVENSEHS CONSULTING

Bridgestone Americas Tire Operations, LLC
Warren Plant

Mixer 627
2023 Expansion

Public Version - Trade Secret Information Redacted

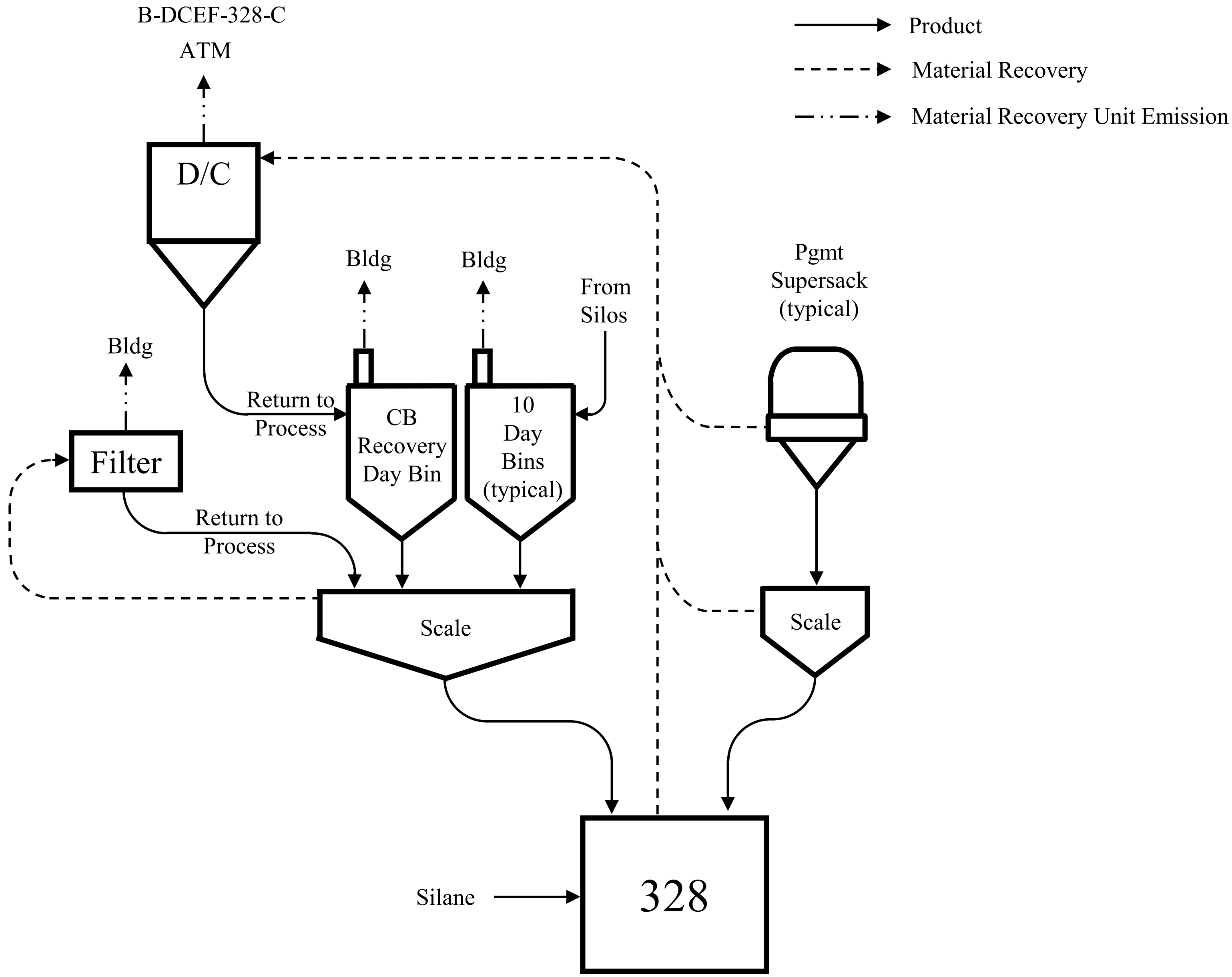


STEVENSEHS CONSULTING

Bridgestone Americas Tire Operations, LLC

Warren Plant

Pigment Room #2
2023 Expansion

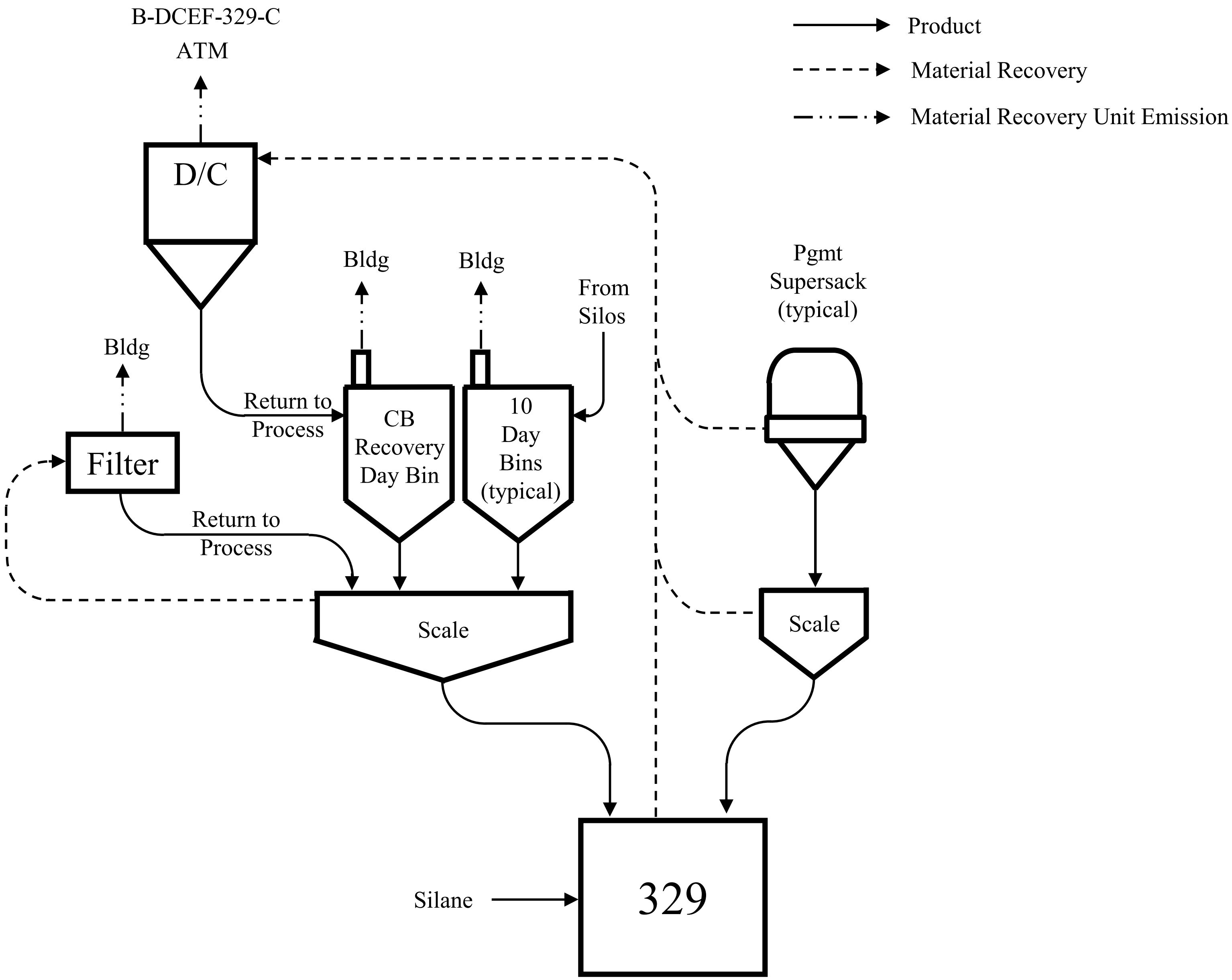


STEVENSEHS CONSULTING

Bridgestone Americas Tire Operations, LLC
Warren Plant

Mixer 328
2023 Expansion

Public Version - Trade Secret Information Redacted



STEVENSEHS CONSULTING

Bridgestone Americas Tire Operations, LLC
Warren Plant

Mixer 329
2023 Expansion

BRIDGESTONE AMERICAS TIRE OPERATIONS, LLC

APPENDIX F

INSIGNIFICANT ACTIVITIES

Public Version - Trade Secret Information Redacted

Insignificant Activities per TAPCR 1200-3-9-.04, Exemptions Effective November 2022

for

Bridgestone Americas Tire Operations, LLC - Warren Plant

Morrison, Tennessee

Table of Contents

A: Introduction

The Tennessee Air Pollution Control Regulations (TAPCR) concerning Title V Permit applications include "insignificant activities", which are activities which are not required to be included in Title V Permit applications. Some of these insignificant activities are required to be listed in the application, but the associated calculations are not required unless requested by the State. Other insignificant activities are not required to be listed in the application but have emission limits to qualify as insignificant activities. The final group of insignificant activities is identified by category only. This document includes the insignificant activities identified for the Bridgestone Americas Tire Operations, LLC – Warren (BATO-Warren) facility in Morrison, Tennessee.

The insignificant activities listed in the Title V Permit application are identified in TAPCR 1200-3-9-.04(5)4 (i) as follows:

- Any air emissions from an air emissions unit or activity at a stationary source for which the emissions unit or activity has a potential to emit less than 5 tons per year of each regulated air pollutant that is not a hazardous air pollutant, and less than 1,000 pounds per year of each hazardous air pollutant. Such emission units and activities or types of emission units and activities must be listed in the permit application.

These activities are listed with applicable calculations in Section B of this document.

The categorical insignificant activities with emission limits are identified in TAPCR 1200-3-9-.04(5)4 (ii) as follows:

- The emission unit or activity, with the exception of parts 19. and 84., is listed in subparagraph (5) (f) as not having to be included in a Title V application. For an activity listed in subparagraph (5) (f), with the exception of parts 1., 2., 19., and 84., the emissions unit or activity must have a potential to emit less than 5 tons per year of each regulated air pollutant that is not a hazardous air pollutant, and less than 1,000 pounds per year of each hazardous air pollutant.

These activities are listed with applicable calculations in Section C of this document.

The categorical insignificant activities are identified in TAPCR 1200-3-9-.04(5)4.(iii) as follows:

- The emission unit or activity is listed in subparagraph (5) (g) as not having to be included in a Title V application.

These activities are listed in Section D of this document.

B: Insignificant Activities Listed in Title V Permit Application

The following insignificant activities, per TAPCR 1200-3-9-.04(5)4 (i), are listed in the Title V Permit Application:

1. Learning Center and Employee Services Boilers/Heaters < 10 MMBtu/hr heat input capacity
2. Solvent Storage Tank
3. Tire Spraying (Dopers)
4. Cement Spraying (PM only)
5. Tire Repair
6. Final Inspection Marking
7. Hot Knife Cutting
8. Ultrasonic Knife
9. Oil Storage Tanks
10. Tire Testing Room
11. Electron Beam Generator (Precure Machine)
12. Mold Cleaning
13. ~~Tread Grinders – (REMOVED)~~
14. Inside Day Bins

The applicable calculations for emissions from these insignificant activities are detailed as follows;

1. Learning Center and Employee Services Boilers/Heaters <10 MMBtu/hr heat input capacity

These boilers/heaters have a maximum heat input capacity of 0.8612 MMBtu/hr each and burn natural gas only. The potential emissions are based upon the emission factors in the Fifth Edition of AP-42 with Supplement D, 1998 - 1.4 Natural Gas Combustion.

Annual Gas Usage:	2 * 0.8612 MMBtu/hr / 1020 Btu/scf gas * 8760 hr/yr	= 14.79 MMscf/yr
Nitrogen Oxides:	100 lb/MMscf x 14.79 MMscf/yr / 2000 lb/ton	= 0.740 tons NOx/yr
Carbon Monoxide:	84 lb/MMscf x 14.79 MMscf/yr / 2000 lb/ton	= 0.621 tons CO/yr
Particulate –PM10:	7.6 lb/MMscf x 14.79 MMscf/yr / 2000 lb/ton	= 0.056 tons PM10/yr
Sulfur Dioxide:	0.6 lb/MMscf x 14.79 MMscf/yr / 2000 lb/ton	= 0.004 tons SO2/yr
VOC*:	5.5 lb/MMscf x 14.79 MMscf/yr / 2000 lb/ton	= 0.041 tons VOC/yr

*VOC - Volatile Organic Compounds

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs

HAP emissions are included in overall Natural Gas usage.
Total HAP= 1.89 lbs HAP/million scf / 42,016.8 lbs per million scf= 4.49E-05 lbs HAP/ lb natrl gas
Formaldehyde= l.79E-06 lbs HAP/lbs natrl gas
Hexane= 4.28E-05 lbs HAP/lbs natrl gas

2. Solvent Storage Tank

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the Cement Storage Tank. The printout from the TANKS software is in Appendix B.

Annual VOC emissions from the Solvent Storage Tank: 238 lbs /yr/ 2000 = 0.12 tons VOC/yr

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs

HAP - no emissions

3. Tire Spraying (Dopers)

Dope is sprayed on the inside of green tires to prevent the tires from sticking to the tire curing presses. The doping operations are ventilated to control overspray and have cyclones to prevent overspray particulate from accumulating in the stack. Each doper is a separate emission source that works independently from the other dopers.

Doper - Maximum

Assumptions:

1. The maximum capacity per doper is [redacted] tires per day or [redacted] tires per year.
2. A maximum of [redacted] grams of dope is applied to the tires
3. Overspray is 5%
4. Cyclone efficiency is 80%

VOC Emissions - included in permit reporting

PM Emissions:

Actual Maximum
[redacted] tires/year)([redacted] g/tire)[redacted] g Solids/ g Dope)(.05 Overspray)(.20 Control Efficiency)(1.0 lb/ 453.6 g) (ton/ 2000 lb)= 0.453 tons PM per year

Maximum Potential – Cyclone efficiency is not used
([redacted] tires/year)[redacted] g/tire)[redacted] g Solids/ gDope)(.05 Overspray)(1.0 lb/ 453.6 g)(ton/ 2000 lb) = 2.263 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs
HAP - no emissions

4. Cement Spraying (PM only)

Cement is sprayed on the surface of the tire tread prior to assembly. Overspray catch pans, exhaust air system, and in-line particulate filters are used to control emissions from this operation.

Assumptions:

1. The maximum capacity is [redacted] tires per day or [redacted] tires per year.
2. An average of 11 grams of cement is applied to each tire.
3. Overspray is 10%, with 100% capture.
4. Solids content of the cement is 9%.

PM Emissions:

Maximum Potential
([redacted] tires/yr)[redacted] g/tire)([redacted] solids)(lb/454 g)(0.10)(ton/2000 lb)= 0.54 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs
HAP - no emissions

5. Tire Repair

This source consists of tire repair, where small amounts of rubber are removed from the tires and filled with uncured rubber. These areas are then spot cured. There are particulate and VOC emissions associated with buffing the repaired areas with a small hand-held buffing wheel, particulate and VOC emissions from application of tire repair paint (VOC emissions are permitted) and VOC emissions associated with the spot curing.

Assumptions:

1. The maximum capacity is [redacted]
2. An average of 2% of the tires require repair.
3. An average of 45 grams of rubber is removed per repair with an average of 45 grams of rubber cured onto the repair.
4. Particulate emissions from each tire repair station enter the plant building, where 50% settle to the plant floor and 50% discharge to atmosphere.
5. Cyclone efficiency is 80% and Fabric Filter efficiency is 99%.
6. The emission factor for rubber curing is 2.24E-04 lb VOC per lb of rubber.
7. The emission factor for rubber grinding is 1.59E-02 lb VOC per lb of rubber removed.
8. Tire repair paint maximum usage is 266.7 gallons/month with 15.6% solids (VOCs are accounted for in permit - PM emissions are insignificant).
9. Tire repair paint density is 7.17 lbs/gal.
10. Tire repair paint overspray is 50%.

VOC Emissions:

[redacted](2 repair/ 100 tires)(45 g rubber/ repair)(1.0 lb/ 453.6 g)
(2.24E-04 lb VOC/ lb rubber)(ton / 2000 lb)= 0.0011 tons VOC per year from curing.
[redacted](2 repair/ 100 tires)(45 g rubber/ repair)(1.0 lb/ 453.6 g)
(1.59E-02 lb VOC/ lb rubber)(ton / 2000 lb)= 0.0785 tons VOC year from grinding.
Total VOC = 0.0796 tons VOC per year

HAP Emissions from Tire Repair
Curing HAPs with POMs = 1.15E-03 lbs HAP/ lb rubber cured
Grinding HAPs with POMs = 1.13E-03 lbs HAP/ lb rubber grinding
Buffing HAPs with POMs = 1.687E-03 lbs HAP/ lb rubber buffed

Total HAPs with POMs = Tire repair curing + Grinding + Buffing = 3.971E-03 lbs HAP/ lb rubber repaired
Total HAPs [redacted](4 repair/100 tires)(45 g rubber/repair) (1.0 lb/ 453.6 g) (3.971 E-03 lbs HAP/ lb rubber repaired) = 78.45 lbs HAPs per year

PM Emissions:

Actual Maximum
Rubber grinding – [redacted](2 repair/ 100 tires)(45 g Rubber/ repair)(.50 Room Settling) (0.01 water filter efficiency)(1.0 lb/ 453.6 g)(ton / 2000 lb)= 0.0247 tons PM per year

Tire repair paint – (266.7 gal/mo)(12 mo/yr)(7.17 lbs/gal)(0.156 solids)(0.50 overspray)(.50 Room Settling)(0.01 water filter efficiency)(ton / 2000 lb)= 0.0045 tons PM per year

Total Actual Maximum:0.0247 + 0.0045 = 0.0292 tons PM per year

Maximum Potential – do not use cyclone and fabric filter control efficiency
Rubber grinding – [redacted](2 repair/ 100 tires)(45 g Rubber/ repair)(.50 Room Settling)
.
(1.0 lb/ 453.6 g)(ton / 2000 lb)= 2.47 tons PM per year

Tire repair paint – (266.7 gal/mo)(12 mo/yr)(7.17 lbs/gal)(0.156 solids)(0.50 overspray)(.50 Room Settling) (ton/ 2000 lb)= 0.447 tons PM per year

Total Actual Maximum: 2.47 + 0.447 = 2.917 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs HAP emissions for particulate are included in HAP emission calculations

6. Final Inspection Marking

Aerosol spray cans to mark scrap tires in Final Inspection.

Assumptions:

1. 200 spray paint cans per year are used on average to mark scrap tires. Assume double (400 cans) are used to be extra conservative.

VOC Emissions:
400 spray cans/yr (10 oz/can)(lb/16oz) = 250 lbs VOC/year or 0.125 tons VOC/year

HAP Emissions:
400 spray cans/yr (10 oz/can)(lb/16oz) * 14% = 35 lbs
HAP/year Aerosol spray cans contain 14% Toluene
Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <l 000 pounds HAPs

7. Hot Knife Cutting

0 Emissions in tons per year – Engineering Judgement

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs HAPs – no emissions

8. Ultrasonic Knife

0 Emissions in tons per year – Engineering Judgement

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs HAPs – no emissions

9. Oil Storage Tanks

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the Oil Storage Tanks.

RM010 Tank = 0.25 lbs/year
Additional (NEW) RM010 Tank = 0.25 lbs/year (identical size and contents)
RS012 Tank = 28.49 lbs/year
Additional (NEW) RS012 Tank = 28.49 lbs/year (identical size and contents)
WS019 Tank = 9.07 lbs/year
Additional (NEW) WS019 Tank = 9.07 lbs/year (identical size and contents)
RS300 Tank (*EMPTY*) = (*11.58 previously*) 0 lbs/year since tank is *EMPTY*
RS220 Tank = 11.58 lbs/year
Total 87.2 lbs / 2000 = 0.044 tons/year

Annual VOC emissions from the Oil Storage Tanks: 0.044 tons VOC/yr

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs

10. Tire Testing Room

Tires are tested at the facility to simulate road performance. Rubber worn from the tread surface is collected in a dust collector system, which discharges material to a collection drum.

Assumptions:

1. All worn rubber is collected by the air duct system. There are no other vents to atmosphere.
2. The dust collector/separator efficiency is 99%.
3. The collection drum receives 0.525 pounds of rubber per day, 365 day per year.

PM Emissions:

PM = Throughput (1-eff)
Collection= Throughput
(eff) Therefore,
Actual Maximum

PM = Collection (1-eff) / (eff) = 0.525 lbs/day (365 days/yr) (ton/2000 lbs) (1-0.99) / (0.99)
= 0.001 tons PM per year
Maximum Potential – dust collector/separator efficiency is

not used PM= 0.525 lbs/day (365 days/yr) (ton/2000 lbs) =
0.1 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs HAPs – no emissions

11. Two Electron Beam Generators (Precure machine)

Select rubber components are cured prior to assembly. The electron beam generator device generates ozone, VOC, and NOx. There are no emissions control devices. Each Electron Beam Generator is a separate emission source that works independently from the other Electron Beam Generator.

Assumptions:

1. The rate of ozone generation R_0, is 0.11 kg/kw-hr.
2. Ozone generation is given by the equation $Q=R_0W$ where W = energy loss per unit time (kw)
3. Energy loss is given by the equation $W = V_L \times I \times A$ where V_L = voltage loss in air path
   I = electron beam current
   A = effective beam area
4. From Bridgestone/Firestone records, voltage loss V_L is 52.9 kV.
5. NHV America, Inc., vendor of the electron beam generator, state the electron beam current I for this application equals 40 mA rather than the rated amperage of 68 mA.
6. The effective beam area is assumed to be 100%, with two heads in use.
7. The maximum capacity is [redacted] subject to pre- curing.
8. Emission factors for VOC and NOx are 3.37E-04 and 0.5 pounds per hour, respectively, based upon engineering judgement.
9. VOC emissions from this source are included in the emission factors for curing, therefore the VOC emissions are 0 for this source to avoid double counting.

Ozone Emissions:

$Q = R_0W$

$W=V_L x I x A$

Therefore,

$Q=R_0[V_L \times I \times A]$

Q = 0.11 kg/kw-hr[52.9 kV(0.04 A) 100% (2 heads)] (2.2 lb/kg) (8760 hr/yr) (ton/2000 lb) Q = 4.486 tons Ozone per year, each

VOC Emissions:

0 VOC tons per year - emissions are included in the permitted curing source.

A calculated emission rate for VOC from this source is 1.8 tons VOC per year, each. This is based upon a 50% cure at this source. This curing VOC emission is accounted for in the emission calculations for tire curing.

NOx Emissions:
0.5 lb NOx/hr(8760 hr/yr) (ton/2000 lb) = 2.19 tons NOx per year, each

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i)
HAPs - no emissions

12. Mold Cleaning

Tire curing molds are cleaned periodically using metal beads.

Assumptions:

1. Mold cleaning typically requires the addition of 30,000 pounds of beads annually.
2. Added beads replace fractured or eroded beads, which are potential air pollutants.
3. Exhaust from mold cleaning has a 99% efficiency dry filter.
4. Minimum efficiency for system particulate control is 50%.
5. Particulate emissions from each bin enter the plant building, where 50% settle to the plant floor and 50% discharge to atmosphere.

Exhaust is vented into the work area; therefore the dry filter must be in place for mold cleaning to be conducted.

PM Emissions:

Actual Maximum
30,000 lbs/year (ton/2000 lbs)(1-0.99)(0.5) = 0.075 tons PM per year

Maximum Potential
30,000 lbs/year (ton/2000 lbs)(1-0.5)(0.5) = 3.75 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i) < 5 tons criteria pollutants, <1000 pounds HAPs HAPs – no emissions

~~**13. Tread Grinders – (REMOVED)**~~

14. Inside Day Bins

Day bins for storage of carbon black are located within the plant building. These bins vent to the plant interior.

Assumptions:

1. A total of 57 bins are present.
2. Only three (3) bins receive carbon black at any given time along with two (2) clay bins.
3. A 6" diameter duct conveys carbon black at 4,000 feet per minute, or 785 cubic feet per minute.
4. Total bin vent emissions are 0.015 grains per dry standard cubic foot.
5. Particulate emissions from each bin enter the plant building, where 50% settle to the plant

Public Version - Trade Secret Information Redacted

floor and 50% discharge to atmosphere.

6. Minimum control from bin vent filters is 0.03 grains per dry standard cubic foot (1/2 control efficiency)

Exhaust is vented into the work area; therefore the bin vent filters must be in place for carbon black/pigment transfers to be conducted.

PM Emissions:

Actual Maximum
5 * 785 cfm (0.015 gr./dscf)(lb./7000 gr.)(60 min/hour)(8760 hr/year)(ton/2000 lbs)(0.50) = 1.105 tons PM per year

Maximum Potential
5 * 785 cfm (0.03 gr./dscf)(lb./7000 gr.)(60 min/hour)(8760 hr/year)(ton/2000 lbs)(0.50) = 2.21 tons PM per year

Citation: TAPCR 1200-3-9-.04(5)(a)4.(i)
HAPs, For carbon black handling (all)= l.35E-08 lbs PACs / lb carbon black usage
[redacted] x l.35E-08 lbs PACs / lb carbon black usage = 1.96 lbs HAPs/year

C: Categorical Insignificant Activities if Below Emission Limits

The following insignificant activities are not required to be listed in the Title V Permit Application if the potential emissions are below the insignificant activity emission limits:

1.	Two 30,000 gallon #2 Fuel Oil Storage Tanks	TAPCR 1200-3-9-.04(5)(f)17
2.	300 gallon Diesel Tanks (2)	TAPCR 1200-3-9-.04(5)(f)17
3.	300 gallon Kerosene Tank	TAPCR 1200-3-9-.04(5)(f)17
4.	300 gallon Gasoline Tank	TAPCR 1200-3-9-.04(5)(f)17
5.	Portable Diesel Air Compressors	TAPCR 1200-3-9-.04(5)(f)37
6.	Standby Diesel Emergency Generator	TAPCR 1200-3-9-.04(5)(f)37
7.	Standby Natural Gas Generator	TAPCR 1200-3-9-.04(5)(f)37
8.	Diesel Powered Emergency Water Pumps	TAPCR 1200-3-9-.04(5)(f)37
9.	Two 550 gallon Diesel Tanks	TAPCR 1200-3-9-.04(5)(f)17
10.	Space Heaters	TAPCR 1200-3-9-.04(5)(f)14
11.	Water Cooling Towers	TAPCR 1200-3-9-.04(5)(f)15
12.	Parts Washer	TAPCR 1200-3-9-.04(5)(f)76
13.	Personal Protective Equipment Vacuum Stations	TAPCR 1200-3-9-.04(5)(f)94

1. Two 30,000 gallon #2 Fuel Oil Storage Tanks TAPCR 1200-3-9-.04(5)(f)17

EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the two #2 fuel oil storage tanks.

Annual VOC emissions from the #2 Fuel Oil Storage Tanks: 35.74 lbs x 2 tanks/ 2000 = 0.04 tons VOC/yr
HAPs – 1.44E-06 lbs HAPs / lbs #2 Fuel Oil combusted, AP-42, no HAPs in #2 Fuel Oil MSDS.

2. 300 gallon Diesel Tanks (2) TAPCR 1200-3-9-.04(5)(f)17

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the two 300 gallon diesel tanks.

Annual VOC emissions from the Diesel Storage Tanks: (0.07 lbs+ 0.13 lbs)/ 2000 = 0.0001 tons VOC/yr
HAPs – 1.25E-04 lbs HAPs/ lbs Diesel combusted, AP-42, no HAPs listed in MSDS for Diesel.

3. 300 gallon Kerosene Tank TAPCR 1200-3-9-.04(5)(f)17

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the 300 gallon kerosene tank.

Annual VOC emissions from the Kerosene Storage Tank: 0.21 lbs/ 2000 = 0.0001 tons VOC/yr HAPs - no emissions

4. 300 gallon Gasoline Tank TAPCR 1200-3-9-.04(5)(f)17

UNIT NO LONGER EXEMPT PER SUBPART CCCCCC (added through Minor Modification submitted January 30,2015)

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the 300 gallon gasoline tank.

Annual VOC emissions from the Gasoline Storage Tank: 96.01 lbs/ 2000 = 0.05 tons VOC/yr
Annual HAP emissions from Gasoline Storage Tank: 96.01 lbs/yr* 20.2% = 19.39 lbs HAP/yr HAP factor per gallons of gas used: 19.39 lbs HAP/yr/ (450 gallons gas/yr* 6.123 lbs/gal)
= 7.0E-03 lbs HAP/ lb of gas

5. Portable Diesel Air Compressors **TAPCR 1200-3-9-.04(5)(f)37**

These portable diesel air compressors have a maximum fuel input capacity of 6.447 MMBtu/hr (2 @ 1500 CFM portable air compressors of 23.53 gal/hr diesel x 0.137 MMBtu/gal x 2 = 6.447 MMBtu/hr each). The potential emissions are based upon the emission factors in the Fifth Edition of AP-42-3.3 Gasoline and Diesel Industrial Engines.

Annual Hours used: 240 (10 days)
Nitrogen Oxides: 4.41 lb NOx/MMBtu x 6.447 MMBtu/hr x 240 hrs/yr / 2000 lb/ton = 3.4 tons NOx/yr
Carbon Monoxide: 0.95 lb CO/MMBtu x 6.447 MMBtu/hr x 240 hrs/yr / 2000 lb/ton = 0.7 tons CO/yr
Particulate – PM10: 0.31 lb PM10/MMBtu x 6.447 MMBtu/hr x 240 hrs/yr / 2000 lb/ton = 0.2 tons PM10/yr
Sulfur Dioxide: 0.29 lb SO2/MMBtu x 6.447 MMBtu/hr x 240 hrs/yr / 2000 lb/ton = 0.2 tons SO2/yr
VOC*: 0.36 lb VOC/MMBtu x 6.447 MMBtu/hr x 240 hrs/yr / 2000 lb/ton = 0.3 tons VOC/yr
*VOC - Volatile Organic Compounds
HAPs - included above at #2

6. Standby Diesel Emergency Generator - UNIT NO LONGER EXEMPT PER SUBPART ZZZZ (added through Minor Modification submitted January 30, 2015)

This standby diesel emergency generator has a horsepower rating of 15.4. The potential emissions are based upon the emission factors in the Fifth Edition of AP-42 – 3.3 Gasoline and Diesel Industrial Engines.

Max Rated HP 15.4 HP 11.5 KW = 15.4 HP

	Days	Hours	lb/HP	HP rating	Lbs/year	Ton/year
Nitrogen Oxide	20	480	0.031	15.4	229	0.11
Carbon Monoxide	20	480	0.00668	15.4	49	0.02
PM10	20	480	0.0022	15.4	16	0.01
Sulfur Dioxide	20	480	0.00205	15.4	15	0.01
VOC	20	480	0.00251	15.4	19	0.01

HAPs - included above at #2

7. Standby Natural Gas Emergency Generator

This standby natural gas emergency generator has a horsepower rating of 153.7. The potential emissions are based upon the emission factors in the Fifth Edition of AP-42 - 3.3 Gasoline and Diesel Industrial Engines.

Max Rated HP 153.7 HP 153.7 HP = 0.391341MMBtu/hr

	Days	Hrs	Lb/MMBtu	MMBtu/hr	Lbs/year	Tons/year
NOx	20	480	2.27	0.3913413	426	0.2132
CO	20	480	3.51	0.3913413	659	0.3297
PM10	20	480	9.50E-03	0.3913413	2	0.0009
Sulfur Dioxide	20	480	5.88E-04	0.3913413	0	0.0001
VOC	20	480	2.96E-02	0.3913413	6	0.0028

HAPs

985.225	SCF/MMBtu		
480	Hrs/year		
0.391341	MMBtu/hr		
185,068	SCF/year	From HAP calc. sheet	0.35 lbs/year

8. Diesel Powered Emergency Water Pumps TAPCR 1200-3-9-.04(5)(f)37
UNITS NO LONGER EXEMPT PER SUBPART ZZZZ (added through Minor Modification submitted January 30, 2015)

These diesel powered emergency water pumps have a maximum horsepower of 532 hp (2 water pumps of 266 hp each). The potential emissions are based upon the emission factors in the Fifth Edition of AP-42-3.3 Gasoline and Diesel Industrial Engines.

Max Rated HP 266 HP X 2 PUMPS 396.7 KW = 532 HP

EMISSIONS INCLUDED IN PLANTWIDE EMISSIONS CALCULATIONS EXCEL FILE.

9. Two 550 gallon Diesel Tanks TAPCR 1200-3-9-.04(5)(f)17

The EPA storage tank emission calculation software – TANKS Version 4.0.9d was used to determine the emissions from the Cement Storage Tank. The printout from the TANKS software is in Appendix B.

Annual VOC emissions from the Diesel Storage Tanks: 2 x 0.3 lbs/ 2000 = 0.0003 tons VOC/yr HAPs - included above at #2, no HAPs listed in MSDS for Diesel

10. Space Heaters TAPCR 1200-3-9-.04(5)(f)14

These space heaters are used during cold weather at the shipping warehouse. There are twenty-four 75,000 Btu/hr heaters and fourteen 400,000 Btu/hr natural gas heaters. The maximum annual usage of these heaters would be six months per year. The potential emissions are based upon the emission factors in the Fifth Edition of AP-42 with Supplement D**,** 1998 - 1.4 Natural Gas Combustion.

75,000 Btu/hr heaters

Annual Gas Usage:	24*0.075 MMBtu/hr /1020 Btu/scf gas * 4380 hr/yr	= 7.729 MMscf/yr
Nitrogen Oxides:	94 lb/MMscf x 7.729 MMscf/yr / 2000 lb/ton	= 0.3633 tons NOx/yr
Carbon Monoxide:	40 lb/MMscf x 7.729 MMscf/yr / 2000 lb/ton	= 0.1546 tons CO/yr
Particulate:	7.6 lb/MMscf x 7.729 MMscf/yr / 2000 lb/ton	= 0.0294 tons PM10/yr
Sulfur Dioxide:	0.6 lb/MMscf x 7.729 MMscf/yr / 2000 lb/ton	= 0.0023 tons SO2/yr
VOC*:	5.5 lb/MMscf x 7.729 MMscf/yr / 2000 lb/ton	= 0.0213 tons VOC/yr

*VOC - Volatile Organic Compounds

400,000 Btu/hr heaters

Annual Gas Usage:	14 * 0.4 MMBtu/hr / 1020 Btu/scf gas* 4380 hr/yr	= 24.047 MMscf/yr

Nitrogen Oxides:	100 lb/MMscf x 24.047 MMscf/yr /2000 lb/ton	= 1.2024 tons NOx/yr
Carbon Monoxide:	84 lb/MMscf x 24.047 MMscf/yr / 2000 lb/ton	= 1.0100 tons CO/yr
Particulate:	7.6 lb/MMscf x 24.047 MMscf/yr / 2000 lb/ton	= 0.0914 tons PM10/yr
Sulfur Dioxide:	0.6 lb/MMscf x 24.047 MMscf/yr / 2000 lb/ton	= 0.0072 tons SO2/yr
VOC*:	5.5 lb/MMscf x 24.047 MMscf/yr / 2000 lb/ton	= 0.0661 tons VOC/yr

*VOC - Volatile Organic Compounds

Total Emissions from heaters

Nitrogen Oxides:	= 1.5657 tons NOx/yr
Carbon Monoxide:	= 1.1646 tons CO/yr
Particulate:	= 0.1208 tons PM10/yr
Sulfur Dioxide:	= 0.0095 tons SO2/yr
VOC*:	= 0.0874 tons VOC/yr

*VOC - Volatile Organic Compounds
HAPs included in 2.0, 1 for all natural gas usage

11. Water Cooling Towers TAPCR 1200-3-9-.04(5)(f)15

The following water cooling towers are located at BFNT-Warren;

Two Water Cooling Towers – 4000 GPM each	8000	44%
Water Cooling Tower – 2800 GPM	2800	15%
Two Power House Water Cooling Towers – 1600 GPM each	3200	17%
Hitachi Heater Water Cooling Tower – 9150 GPM (used ½ of year)	4575	24%
	18,575	100%

These five cooling towers operate independently from each other and are separate emission sources. The emissions are particulate from the dissolved solids in water vapor. The emission factors from The Fifth Edition of AP-42 13.4 Wet Cooling Towers and the total dissolved solid (TDS) concentrations in the cooling water are used to determine particulate emissions.

The emission from any HAPs in the biocides is reported as 100% emitted into the atmosphere.

A. Two Water Cooling Towers - 4000 GPM each

8000 gal/min. (60 min/hr)(1.7 lbs water vapor/1000 gallons water)(400 TDS ppm/1,000,000) (8760 hrs/yr)(tons/2000 lbs)= 1.43 tons Particulate/yr

250 gal MBC/yr. (8.59 lb/gal) (0.28) (0.10 naptha VOC)(tons/2000 lbs)= 0.0301 tons VOC/yr

8000 gpm x 60 min/hr x (1.7 lbs water drift/ per 1000 gallons) x (6 parts MECB/ per 1,000,000 parts) x 8760 hrs/yr = 42.9 lbs MECB

Total VOC = 0.0301 tons VOC + 42.9 lbs/2000 lb/ton= 0.0516 tons VOC/yr

B. Water Cooling Tower - 2800 GPM

2800 gal/min. (60 min/hr)(1.7 lbs water vapor/1000 gallons water)(400 TDS ppm/1,000,000) (8760 hrs/yr)(tons/2000 lbs)= 0.5004 tons Particulate/yr

250 gal MBC/yr. (8.59 lb/gal) (0.19)(0.10 naptha VOC)(tons/2000 lbs)= 0.0204 tons VOC/yr

2800 gpm x 60 min/hr x (1.7 lbs water drift/ per 1000 gallons) x (6 parts MECB/ per 1,000,000 parts) x 8760 hrs/yr
= 15.0 lbs MECB

Total VOC = 0.0204 tons VOC + 15.0 lbs(ton/2000 lbs)= 0.0279 tons VOC/yr

C. Power House Water Cooling Towers -Two 1600 GPM Water Cooling Towers

3200 gal/min. (60 min/hr)(1.7 lbs water vapor/1000 gallons water)(400 TDS ppm/1,000,000) (8760 hrs/yr)(tons/2000 lbs)= 0.5719 tons Particulate/yr

250 gal MBC/yr. (8.59 lb/gal) (0.22)(0.10 naptha VOC)(tons/2000 lbs)= 0.0236 tons VOC/yr

3200 gpm x 60 min/hr x (1.7 lbs water drift/ per 1000 gallons) x (6 parts MECB/ per 1,000,000 parts) x 8760 hrs/yr
= 17.2 lbs MECB

Total VOC = 0.0236 tons VOC + 17.2 lbs(ton/2000 lbs)= 0.0322 tons VOC/yr

D. Hitachi Heater Water Cooling Tower - 9150 GPM
This water cooling tower is used during the cooling season only (6 months)

9150 gal/min. (60 min/hr)(1.7 lbs water vapor/1000 gallons water)(400 TDS ppm/1,000,000) (4380 hrs/yr)(tons/2000 lbs)= 0.8176 tons Particulate/yr

250 gal MBC/yr. (8.59 lb/gal) (0.31)(0.10 naptha VOC)(tons/2000 lbs)= 0.0333 tons VOC/yr

9150 gpm x 60 min/hr x (1.7 lbs water drift/ per 1000 gallons) x (6 parts MECB/ per 1,000,000 parts) x 4380 hrs/yr
= 24.5 lbs MECB

Total VOC = 0.0333 tons VOC + 24.5 lbs HAP VOC(ton/2000 lbs)= 0.0456 tons VOC/yr

Total HAPs for each Tower – maximum potential. Biocides are only to be used if cooling tower is having problems with “iron” bacteria.

Current biocide usage does not include any HAP containing chemicals.

12. Parts Washers **TAPCR 1200-3-9-.04(5)(f)76**

Parts washing solvent and parts washing machines are used at BFNT Warren. The VOC emissions from parts washing solvent are based upon the amount of solvent supplied minus the amount of solvent picked up by the parts washer service company. Some or most of this loss is from "carry off' on parts that have been washed. Because estimating the amount of "carry off' is not feasible, all of the loss is assumed to be VOC emission.

(804 gallons solvent to facility in 2004 - 678 gallons solvent picked up at facility in 2004)(6.7 lbs/gal) (ton/2000 lbs)= 0.42 tons VOC/yr

The numbers of solvent parts washing machines have been reduced from 10 to 2

machines. Maximum Potential (engineering judgement) = 0.2 tons VOC/yr

HAPs – no emissions

13. Personal Protective Equipment Vacuum Stations **TAPCR 1200-3-9-.04(5)(f)94**

In the Banbury Department, workers can vacuum off their personal protective equipment at 2 vacuum system stations. Based on 1 pound of collected material after 353 days of use, the total annual emissions;

1 pound/ 353 days of use x 365 days/year x /2000 lbs per ton= 0.0005 tons
per year HAPs – no emissions

D: Categorical Insignificant Activities

The following insignificant activities are not required to be listed in the Title V Permit Application:

1.	Electric Driven Air Compressors	TAPCR 1200-3-9-.04(5)(g)18 HAPs - no emissions
2.	Boiler Water Treatment System	TAPCR 1200-3-9-.04(5)(g)45 HAPs - see 3.0 - 8.
3.	Steam Condensate Relief Valves	TAPCR 1200-3-9-.04(5)(g)50 HAPs - no emissions
4.	QA Laboratory	TAPCR 1200-3-9-.04(5)(g)36 HAPs - no emissions
5.	Maintenance Activities	TAPCR 1200-3-9-.04(5)(g)13 Included in HAP log
6.	Banbury Lab	TAPCR 1200-3-9-.04(5)(g)36 HAPs - no emissions
7.	Battery Charging Stations	TAPCR 1200-3-9-.04(5)(g)19 HAPs -no emissions
8.	Welding Operations	TAPCR 1200-3-9-.04(5)(g)13 Included in HAP log
9.	Sewer Vents	TAPCR 1200-3-9-.04(5)(g)9 HAPs - no emissions
10.	Natural Gas Pressure Regulator Vents	TAPCR 1200-3-9-.04(5)(g)26 HAPs - no emissions

SAFETY DATA SHEET

Chem-Trend® ML-3114

Section 1. Identification

Product name : Chem-Trend® ML-3114

Relevant identified uses of the substance or mixture and uses advised against

Release Agent

Supplier's details : Chem-Trend LP
1445 W McPherson Park Dr
PO Box 860, Howell MI 48844-0860
517-546-4520

Emergency telephone number and Telephone number : +1 517 546 4520

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Prevention : PACKAGE IN VENTED CONTAINERS. PRODUCT IS FORBIDDEN FOR TRANSPORT BY AIRCRAFT BECAUSE OF THE POSSIBILITY THAT HYDROGEN GAS MAY BE RELEASED.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
carbon black, respirable powder	≤1	1333-86-4

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst. PACKAGE IN VENTED CONTAINERS. PRODUCT IS FORBIDDEN FOR TRANSPORT BY AIRCRAFT BECAUSE OF THE POSSIBILITY THAT HYDROGEN GAS MAY BE RELEASED.

Hazardous thermal decomposition products : Decomposition products may include the following materials:

Section 5. Fire-fighting measures

Special protective actions for fire-fighters	:	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	:	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
Remark	:	Product may release hydrogen gas. Increased storage temperatures will accelerate this process. Evolves hydrogen on contact with water. Acid. Amines Alkali. Metals May form explosive mixtures with air.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.
For emergency responders	:	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
Environmental precautions	:	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8).
Conditions for safe storage, including any incompatibilities	:	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.
Additional information	:	PRODUCT MAY RELEASE SMALL QUANTITIES OF FLAMMABLE HYDROGEN GAS DURING STORAGE. Adequately ventilate containers to maintain the concentration of hydrogen gas well below its flammability limits and its exposure guidelines. Ensure that container vents do not become clogged to prevent pressure build-up.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
carbon black, respirable powder	**ACGIH TLV (United States, 3/2018).** TWA: 3 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL (United States, 5/2018).** TWA: 3.5 mg/m³ 8 hours.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Physical state	Liquid.	**Color**	Black.
Odor	Bland.	**Odor threshold**	Not available.
pH	6.4 to 8.4	**Melting point**	Not available.
Boiling point	100°C (212°F)	**Flash point**	Closed cup: Not applicable. [Water-based product]
Burning time	Not applicable.	**Burning rate**	Not applicable.
Evaporation rate	<1 (water = 1)	**Flammability (solid, gas)**	Not available.
Lower and upper explosive (flammable) limits	Not available.	**Vapor pressure**	2.3 kPa (17.5 mm Hg) [room temperature]

Section 9. Physical and chemical properties

Vapor density	>1 [Air = 1]	**Relative density**	1.14
Solubility	Not available.	**Solubility in water**	Not available.
Partition coefficient: n-octanol/water	Not available.	**Auto-ignition temperature**	Not available.
Decomposition temperature	Not available.	**SADT**	Not available.
Viscosity	Kinematic (40°C (104°F)): Not applicable.	**Volatility**	65

Lower and upper explosive (flammable) limits

None identified.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Flammable hydrogen gas may be produced on prolonged contact with metals such as aluminum, tin, lead and zinc. Reactive or incompatible with the following materials: strong acids strong alkalis oxidizing materials water

Hazardous decomposition products : Formaldehyde and silicon dioxide may be evolved at elevated temperatures.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
carbon black, respirable powder	LD50 Oral	Rat	>15400 mg/kg	-

Irritation/Corrosion : No known significant effects or critical hazards.

Sensitization : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Not available.

Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Carbon Black: This component does not impact the product's hazard classification. Due to the product's physical properties, particulate inhalation exposure is not possible as it is inextricably bound within the polymer matrix.

Potential acute health effects

Eye contact	: No known significant effects or critical hazards.
Inhalation	: No known significant effects or critical hazards.
Skin contact	: No known significant effects or critical hazards.
Ingestion	: No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	**Skin contact**
No specific data.	No specific data.
Inhalation	**Ingestion**
No specific data.	No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects	: Not available.
Potential delayed effects	: Not available.

Long term exposure

Potential immediate effects	: Not available.
Potential delayed effects	: Not available.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : D003 Because of its reactivity.

Section 14. Transport information

	DOT Classification	Bulk	TDG Classification	IATA	IMDG
UN number	Not regulated.	Not regulated.	Not regulated.	**Not acceptable for transport by aircraft.**	Not regulated.
UN proper shipping name	-	-	-	-	-
Transport hazard class(es)	-	-	-	-	-
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

Additional information

DOT Classification : -

TDG Classification : -

IMDG : -

IATA : **Not acceptable for transport by aircraft.**

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Inventory list

Australia : All components are listed or exempted.

Canada : All components are listed or exempted.

China : All components are listed or exempted.

Europe : Contact local supplier or distributor.

Japan : **Japan inventory (ENCS)**: All components are listed or exempted.
Japan inventory (ISHL): All components are listed or exempted.

Section 15. Regulatory information

New Zealand	: All components are listed or exempted.
Philippines	: All components are listed or exempted.
Republic of Korea	: All components are listed or exempted.
Taiwan	: All components are listed or exempted.
United States	: All components are listed or exempted.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

Not applicable.

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Not applicable.

State regulations

Massachusetts	: The following components are listed: MICA DUST; TALC; SOAPSTONE
New York	: None of the components are listed.
New Jersey	: The following components are listed: MICA; CARBON BLACK; SOAPSTONE
Pennsylvania	: The following components are listed: MICA-GROUP MINERALS; CARBON BLACK; TALC; SOAPSTONE DUST

California Prop. 65

⚠ **WARNING**: This product can expose you to chemicals including Ethylene oxide, Benzene, which are known to the State of California to cause cancer and birth defects or other reproductive harm. This product can expose you to chemicals including Silica, crystalline, Diethanolamine, Talc , not containing asbestiform fibres, Acetaldehyde, Ethylbenzene, Carbon black, which are known to the State of California to cause cancer, and Ethylene Glycol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 0 / **Flammability :** 0 **Physical hazards :** 1 **Personal protection Code :** B

National Fire Protection Association (U.S.A.)

Health : 1 **Flammability :** 0 **Instability/Reactivity :** 1 **Special :** -

History

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Prepared by	: Chem-Trend Regulatory Affairs Department.

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

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SAFETY DATA SHEET

Section 1 - Chemical Product and Company Information

Akron Paint and Varnish
(dba APV Engineered Coatings)
1390 Firestone Parkway
Akron, Ohio 44301 USA

www.apvcoatings.com
Information Telephone: (800) 772-3452
Facsimile: (330) 773-1028
Emergency Telephone: (330) 773-8911
CHEMTREC: (703) 527-3887

Product Code: D-3125-02
Product Name: ORANGE CURABLE JET PRINTER INK
Product Use: Ink
Not recommended for: Consumer Use

Section 2 - Hazards Identification

GHS Ratings

Flammable liquid	2	Flash point < 23°C and initial boiling point > 35°C (95°F)
Skin corrosive	2	Reversible adverse effects in dermal tissue, Draize score: >= 2.3 < 4.0 or persistent inflammation
Respiratory sensitizer	1	Respiratory sensitizer
Skin sensitizer	1	Skin sensitizer
Mutagen	1B	Known to produce heritable mutations in human germ cellsSubcategory 1B, Positive results: In vivo heritable germ cell tests in mammals, Human germ cell tests, In vivo somatic mutagenicity tests, combined with some evidence of germ cell mutagenicity
Carcinogen	1B	Presumed Human Carcinogen, Based on demonstrated animal carcinogenicity
Reproductive toxin	1B	Presumed, Based on experimental animals
Aspiration hazard	1	Aspiration Toxicity Category 1: Known (regarded)- human evidence - hydrocarbons with kinematic viscosity ? 20.5 mm2/s at 40° C.
Aquatic toxicity	C3	Acute toxicity > 10.0 but <= 100.0 mg/l and lack of rapid degradability and log Kow >= 4 unless BCF < 500 and unless chronic toxicity > 1 mg/l

GHS Hazards

H225	Highly flammable liquid and vapour
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H412	Harmful to aquatic life with long lasting effects.

GHS Precautions

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking
P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment
P241	Use explosion-proof electrical/ventilating/light/manufacturer/equipment

P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash contact area thoroughly after handling.
P272	Contaminated work clothing should not be allowed out of the workplace
P273	Avoid release to the environment
P280	Wear protective gloves/protective clothing/eye protection/face protection
P281	Use personal protective equipment as required
P285	In case of inadequate ventilation wear respiratory protection
P321	Specific treatment (see supplemental first aid instruction on this label)
P331	Do NOT induce vomiting
P362	Take off contaminated clothing and wash before reuse
P363	Wash contaminated clothing before reuse
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/...
P302+P352	IF ON SKIN: wash with plenty of water.
P303+P361+P353	IF ON SKIN (or hair): Take off Immediately all contaminated clothing. Rinse SKIN with water [or shower].
P304+P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P333+P313	IF SKIN irritation or rash occurs: Get medical advice/attention.
P342+P311	IF experiencing respiratory symptoms: Call a POISON CENTER/doctor/...
P370+P378	In case of fire: Use ... to extinguish.
P405	Store locked up
P403+P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

Signal Word: **Danger**

Acute Toxicity

N/A

Conditions Aggravated

N/A

Chronic Effects

N/A

Section 3 - Composition / Information on Ingredients

Chemical Name	CAS number	Weight Concentration %
Distillates, petroleum, light distillate hydrotreating process, low-boiling	68410-97-9	37.00%
Stoddard solvent	8052-41-3	30.00%
Naphtha, petroleum, hydrotreated light	64742-49-0	26.00%
1,3-Butadiene, 2-methyl-, homopolymer	9003-31-0	2.00%
Trimethylbenzene	25551-13-7	1.00% - 5.00%
Titanium (IV) dioxide	13463-67-7	1.00% - 5.00%
Ethylbenzene	100-41-4	0.10% - 1.00%

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Isopropylbenzene	98-82-8	0.10% - 1.00%

Section 4 - First Aid Measures

INHALATION - Move affected person to fresh air, rest in a half upright position, and loosen clothing . If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Seek medical advice after significant exposure.

EYE CONTACT - Flush with large amounts of water for at least 15 minutes. Lift eyelids occasionally. Get prompt medical attention.

SKIN - Wash thoroughly with soap and water immediately. Remove all contaminated clothing immediately. Seek medical advice if irritation persists.

INGESTION - Seek medical advice. The decision to induce vomiting or not must be made by a physician after careful consideration of all matterials ingested. Risk of aspiration into lungs.

Section 5 - Fire Fighting Measures

Suitable Extinguishing Media

Carbon Dioxide---Dry Chemical---Foam---Water Fog
Use water for cooling material stored in vicinity of fire.

Explosion Hazards

Vapors are heavier than air and may travel along the ground to an ignition source some distance from material handling point. Ignition sources include pilot lights, smoking, heaters, electric motors, sparks from electrical switches and static discharges.

CAUTION: Never use cutting torch on empty containers! Residual solvent vapor in empty container may explode. Application to hot surfaces requires special precautions. During emergency conditions, overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain Medical Attention.

Hazardous Combustion Products

N/A

Recommended Fire Equipment

Use self-contained breathing apparatus with a full-face piece operated in a pressure-demand or other positive pressure mode. Wear protective clothing.

Section 6 - Accidental Release Measures

Non-emergency personnel: Evacuate and isolate the area and prevent access. Remove ignition sources. No flares, smoking or flames in hazard area. Notify management. Avoid breathing vapor or mist and put on protective equipment. Control source of the leak. Ventilate.

Emergency responders: See section 8 for any specialized clothing recommendations. Also reference the information for non-emergency personnel

Environmental precautions: Prevent further leakage or spillage if possible. Do not allow the material to spread to drains, sewers, water supplies, or soil. Contact APV (**330-773-8911)** for assistance and advice.

Small Spill: Stop leak if possible and move containers from the spill area. Water soluble: dilute with water and mop up. Water Insoluble: Cover spill area with a suitable absorbent inert material (Kitty Litter, Oil-Dri, etc.) and dispose of in an appropriate metal waste container. Dispose of material through a licensed waste disposal contractor.

Large Spill: Stop leak if possible and move containers from the spill area. Approach release from upwind. Contain spillage and with non-combustible absorbent material and place in appropriate disposal container according to local regulations. Dispose of material through a licensed waste disposal contractor. Report spill to appropriate governing agencies if applicable.

APV requires that CHEMTREC be immediately notified (**800-424-9300**) when this product is unintentionally released from its container during its course of distribution, regardless of the amount released. Distribution includes transportation, storage incidental to transportation, loading and unloading. Such notification must be immediate and made by the person have knowledge of the release.

Section 7 - Handling and Storage

Precautions for Safe Handling

Keep away from food, drink and heat. Keep away from sources of ignition. No smoking. Do not breathe vapor. Avoid contact with skin and eyes. Never use pressure to empty. Take precautionary measures against static discharges.

Storage temperature-
Minimum: do not freeze
Maximum: 40°C (104°F)

Storage Period- See technical data sheet.

Section 8 - Exposure Controls / Personal Protection

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Distillates, petroleum, light distillate hydrotreating process, low-boiling 68410-97-9	Not Established	Not Established	Not Established
Stoddard solvent 8052-41-3	500 ppm TWA; 2900 mg/m3 TWA	100 ppm TWA	NIOSH: 350 mg/m3 TWA 1800 mg/m3 Ceiling (15 min)
Naphtha, petroleum, hydrotreated light 64742-49-0	Not Established	Not Established	Not Established
1,3-Butadiene, 2-methyl-, homopolymer 9003-31-0	Not Established	Not Established	Not Established
Trimethylbenzene 25551-13-7	N/A	25 ppm TWA	N/A
Titanium (IV) dioxide 13463-67-7	15 mg/m3 TWA (total dust)	10 mg/m3 TWA	N/A
Ethylbenzene 100-41-4	100 ppm TWA; 435 mg/m3 TWA	20 ppm TWA	NIOSH: 100 ppm TWA; 435 mg/m3 TWA 125 ppm STEL; 545 mg/m3 STEL

Isopropylbenzene 98-82-8	50 ppm TWA; 245 mg/m3 TWA	50 ppm TWA	NIOSH: 50 ppm TWA; 245 mg/m3 TWA

Engineering Controls: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation, or other controls to keep air containment concentration below current applicable OSHA permissible exposure limit or ACGIH TLV limit, and volatiles below lower explosive limit. Heavy solvent vapors should be removed from the lower levels of area, and all ignition sources (non-explosion proof equipment) should be eliminated if flammable mixtures will be encountered. Remove decomposition products formed during welding or flame cutting of surfaces coated with this product. For baking finishes - vent vapors emitted on heating.

Environmental Controls: Emissions should comply with environmental protection legislation.

Individual Protection Measures:

Hygiene measures- Wash hands, forearms, etc. after handling chemical products, before eating, smoking, and using the lavatory, and the end of the work period. Use appropriate techniques when removing potentially contaminated clothing and wash before reusing. Know the locations of eyewash and safety showers.

Respiratory Protection- Provide adequate ventilation to keep exposure below permissible limits. If a risk assessment deems necessary, operator is to use a properly fitted, air purifying or supplied air respirator. Respirator selection must be based on known/ anticipated exposure levels, the hazards of the product, and the safe working limits of the respirator.

Skin and Body Protection- Wear chemical resistant gloves (nitrile) and paint suits when necessary, based on risk assessment. The most suitable glove must be chosen in consultation with the gloves supplier who can inform about the breakthrough time of the glove material. PPE for the body should be selected based on the risks of the task being performed and approved by a specialist. Appropriate footwear should also be approved.

Eye/Face Protection- Wear approved chemical safety goggles where exposure to vapor or contact with eyes is possible. Eye wash stations should also be made available. If inhalation hazard exists, a risk assessment will determine if a full face respirator may be required

Section 9 - Physical and Chemical Properties

Information on basic physical and chemical properties:

Viscosity: Not determined	**pH:** N/A
% Weight Solids 4.11	**% Volume Solids** 2.41
VOC Wt/Gal (wet) 6.12	**U.S. VOC Wt/Gal (wet)** 6.12
Specific Gravity (SG) 0.765	**Odor:** N/A
Odor Threshold: Not determined	**Color:** Orange
Boiling Point: 150°C	**Flash Point:** 32°F,0°C
LEL/UEL: N/A	**Autoignition Temperature:** 226°C
Evaporation Rate (nBuAc=1): Not determined	**Vapor Pressure:** N/A
Vapor Density: N/A	**Freezing Point:** Not determined
Partition coefficient: Not determined	

Section 10 - Stability and Reactivity

Stability and reactivity profile

This material is considered stable

Hazardous polymerization will not occur.

The following materials should be avoided in contact with the mixture

Strong acids

Oxidizing agents

Hazardous decomposition products

Titanium/titanium oxides

Section 11 - Toxicological Information

Mixture Toxicity

Oral Toxicity LD50: 4,631mg/kg

Dermal Toxicity LD50: 3,162mg/kg

Component Toxicity

68410-97-9	Distillates, petroleum, light distillate hydrotreating process, low-boiling Oral LD50: 5,000 mg/kg (Rat) Dermal LD50: 2,000 mg/kg (Rabbit) Inhalation LC50: 3,367 ppm (R
64742-49-0	Naphtha, petroleum, hydrotreated light Oral LD50: 2,000 mg/kg (Rat) Dermal LD50: 2,000 mg/kg (Rabbit)
100-41-4	Ethylbenzene Oral LD50: 3,500 mg/kg (Rat) Inhalation LC50: 17 mg/L (Rat)

LC_{50} and LD_{50} toxicity for this product are merely estimates and have yet to be determined. For individual component ecotoxicity, please refer to Section 11.

Possible Routes of Entry

Inhalation Skin Contact Eye Contact Ingestion

Potential Target Organs

Blood Eyes Kidneys Central Nervous System Skin Respiratory System

Effects of Overexposure

Not Available

The following components are possible carcinogens

***Materials labeled a carcinogen in dust form are supplied in solution, thus eliminating the hazard.**

CAS Number	Description	% Weight	Carcinogen Rating
13463-67-7	Titanium (IV) dioxide	1 to 5%	Titanium (IV) dioxide: (*dust) NIOSH: potential occupational carcinogen IARC: Possible human carcinogen OSHA: listed
68410-97-9	Distillates, petroleum, light distillate hydrotreating process, low-boiling	37	Distillates, petroleum, light distillate hydrotreating process, low-boiling: EU REACH: Present (P)
64742-49-0	Naphtha, petroleum, hydrotreated light	26	Naphtha, petroleum, hydrotreated light: EU REACH: Present (P)
100-41-4	Ethylbenzene	0.1 to 1.0%	Ethylbenzene: IARC: Possible human carcinogen OSHA: listed

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98-82-8	Isopropylbenzene	0.1 to 1.0%	Isopropylbenzene: IARC: Possible human carcinogen OSHA: listed
8052-41-3	Stoddard solvent	30	Stoddard solvent: EU REACH: Present (P)

Section 12 - Ecological Information

Mixture Ecotoxicity

Toxicity- Do not release into environment. May cause long term adverse effects.
Persistence and degradability- N/A
Bioaccumulative potential- N/A
Mobility in Soil- N/A

Component Ecotoxicity

Trimethylbenzene	96 Hr LC50 Pimephales promelas: 7.72 mg/L [flow-through]
Ethylbenzene	96 Hr LC50 Oncorhynchus mykiss: 11.0 - 18.0 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 4.2 mg/L [semi-static]; 96 Hr LC50 Pimephales promelas: 7.55 - 11 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 32 mg/L [static]; 96 Hr LC50 Pimephales promelas: 9.1 - 15.6 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 9.6 mg/L [static] 48 Hr EC50 Daphnia magna: 1.8 - 2.4 mg/L 72 Hr EC50 Pseudokirchneriella subcapitata: 4.6 mg/L; 96 Hr EC50 Pseudokirchneriella subcapitata: >438 mg/L; 72 Hr EC50 Pseudokirchneriella subcapitata: 2.6 - 11.3 mg/L [static]; 96 Hr EC50 Pseudokirchneriella subcapitata: 1.7 - 7.6 mg/L [static]
Isopropylbenzene	96 Hr LC50 Pimephales promelas: 6.04 - 6.61 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 4.8 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 2.7 mg/L [semi-static]; 96 Hr LC50 Poecilia reticulata: 5.1 mg/L [semi-static] 48 Hr EC50 Daphnia magna: 0.6 mg/L; 48 Hr EC50 Daphnia magna: 7.9 - 14.1 mg/L [Static] 72 Hr EC50 Pseudokirchneriella subcapitata: 2.6 mg/L

Section 13 - Disposal Considerations

Dispose of in accordance with federal, state and local regulations. Controlled incineration is recommended for disposal of unused product. Prevent contamination of soil, drains and surface waters. Dispose of large containers to a licensed reconditioner. Dispose of small containers in compliance with local regulations.

Section 14 - Transport Information

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
DOT	PAINT	UN1263	II	3
	IATA Pkg Instr: Y341/353/364; IMDG EmS: F-E, S-D			

Section 15 - Regulatory Information

The following chemicals are listed in Californa Title 8 CCR Sections as Hazardous Substances

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed in Section 64 of the Canadian Environmental Protection Act, 1999 (CEPA)

- None

The following chemicals are classified by China - Environmental Quality Standards for Surface Water
- None

The following chemicals have been listed by the EU-End of Life Vehicles (2000/53/EC) (ELV):
- None

The following chemicals are listed in the EU-Substances of Very High Concern (2008/67/ED) (SVHC):
- None

The following chemcials are listed in the EU-Restriction of the use of certain Hazardous Substances (2011/65/EU) (RoHS):
- None

The following chemicals are listed under the European Union- Waste Electrical and Electronic Equipment (2012/19/EU) (WEEE)
- None

The following chemicals are included in the Global Automotive Declarable Substance List (GADSL)
- None

The following substances are required for notification by the Japanese Enforcement Order of the Industrial Safety and Health Law (ISHL):

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
64742-49-0 Naphtha, petroleum, hydrotreated light
8052-41-3 Stoddard solvent

The following chemicals are listed on the Massachusetts Right-to-Know Hazardous Substances List.

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed on the New Jersey Right-to-Know Hazardous Substances List.

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed on the Pennsylvania Right-to-Know Hazardous Substances List.

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed by the State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

100-41-4 Ethylbenzene 0.1 to 1.0 % Carcinogen
98-82-8 Isopropylbenzene 0.1 to 1.0 % Carcinogen
13463-67-7 Titanium (IV) dioxide 1 to 5 % Carcinogen

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires certain facilities manufacturing, processing, or otherwise using listed toxic chemicals to report their environmental releases of such chemicals annually. The following chemicals are listed:

100-41-4 Ethylbenzene 0.1 to 1.0 %
98-82-8 Isopropylbenzene 0.1 to 1.0 %

Under Section 12(b) of the Toxic Substances Control Act (TSCA), exporters may need to notify the U.S. Environmental Protection Agency if they export or intend to export a product containing a chemical substance that is present on this list. The following substances are containted within this material:

- None

The following chemicals are listed as a *Hazardous Air Pollutant* under listed under the U.S. CAA (Clean Air Act)

100-41-4 Ethylbenzene
98-82-8 Isopropylbenzene

Country	Regulation	All Components Listed
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Canadian Domestic Substances List (DSL)	Yes
Canada	Canadian Non-Domestic Substances List (NSDL)	No
China	Inventory of Existing Chemical Substances Produced or Imported in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Europe	REACH Registered or Pre-Registered Substances and Intermediates	Yes
Japan	Japanese Inventory of Existing and New Chemical Substances (ENCS)	No
Japan	Japan Inventory of Industrial Saftey and Health Law Substances (ISHL)	No
Korea	Korean Existing Chemical Inventory (KECI)	Yes
New Zealand	New Zealand Inventory of Chemicals (NZIoC)	Yes
Philippines	Philippines Inventory of Chemicals and Chemical Substances (PICCS)	Yes
USA	Toxic Substances and Control Act (TSCA)	Yes

EU Risk Phrases

Not Available

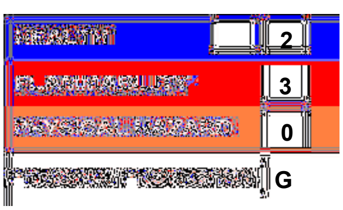
Safety Phrase

Not Available

Section 16 - Other Information

NFPA and HMIS use a numbering scale ranging from 0 to 4 to indicate the degree of hazard. A value of zero means that the substance possesses essentially no hazard; a rating of four indicates extreme danger. Although similar, the two rating systems are intended for different purposes, and use different criteria. The NFPA system was developed to provide an on-the-spot alert to the hazards of a material, and their severity, to emergency responders. The HMIS system was designed to communicate workplace hazard information to employees who handle hazardous chemicals.

Hazardous Material Information System (HMIS)

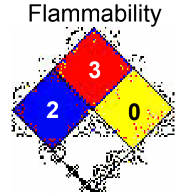


HMIS & NFPA Hazard Rating Legend
*** = Chronic Health Hazard**
0 = INSIGNIFICANT
1 = SLIGHT
2 = MODERATE
3 = HIGH

National Fire Protection Association (NFPA)

Flammability

Health



Instability

Special

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Date revised: 2019-01-10
Date Prepared: 1/10/2019

Revision No:
Reviewer ID: KVosecky

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SAFETY DATA SHEET

Section 1 - Chemical Product and Company Information

Akron Paint and Varnish
(dba APV Engineered Coatings)
1390 Firestone Parkway
Akron, Ohio 44301 USA

www.apvcoatings.com
Information Telephone: (800) 772-3452
Facsimile: (330) 773-1028
Emergency Telephone: (330) 773-8911
CHEMTREC: (703) 527-3887

Product Code: D-4936-01
Product Name: YELLOW CURABLE JET PRINTER INK
Product Use: Ink
Not recommended for: Contact with food

Section 2 - Hazards Identification

GHS Ratings

Flammable liquid	2	Flash point < 23°C and initial boiling point > 35°C (95°F)
Skin corrosive	2	Reversible adverse effects in dermal tissue, Draize score: >= 2.3 < 4.0 or persistent inflammation
Respiratory sensitizer	1	Respiratory sensitizer
Skin sensitizer	1	Skin sensitizer
Mutagen	1B	Known to produce heritable mutations in human germ cellsSubcategory 1B, Positive results: In vivo heritable germ cell tests in mammals, Human germ cell tests, In vivo somatic mutagenicity tests, combined with some evidence of germ cell mutagenicity
Carcinogen	1B	Presumed Human Carcinogen, Based on demonstrated animal carcinogenicity
Aspiration hazard	1	Aspiration Toxicity Category 1: Known (regarded)- human evidence - hydrocarbons with kinematic viscosity ? 20.5 mm2/s at 40° C.
Aquatic toxicity	C2	Acute toxicity > 1.00 but <= 10.0 mg/l and lack of rapid degradability and log Kow >= 4 unless BCF < 500 and unless chronic toxicity > 1 mg/l

GHS Hazards

H225	Highly flammable liquid and vapour
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H340	May cause genetic defects.
H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.

GHS Precautions

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking
P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment
P241	Use explosion-proof electrical/ventilating/light/manufacturer/equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge

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P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash contact area thoroughly after handling.
P272	Contaminated work clothing should not be allowed out of the workplace
P273	Avoid release to the environment
P280	Wear protective gloves/protective clothing/eye protection/face protection
P281	Use personal protective equipment as required
P285	In case of inadequate ventilation wear respiratory protection
P321	Specific treatment (see supplemental first aid instruction on this label)
P331	Do NOT induce vomiting
P362	Take off contaminated clothing and wash before reuse
P363	Wash contaminated clothing before reuse
P391	Collect spillage
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/...
P302+P352	IF ON SKIN: wash with plenty of water.
P303+P361+P353	IF ON SKIN (or hair): Take off Immediately all contaminated clothing. Rinse SKIN with water [or shower].
P304+P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P333+P313	IF SKIN irritation or rash occurs: Get medical advice/attention.
P342+P311	IF experiencing respiratory symptoms: Call a POISON CENTER/doctor/...
P370+P378	In case of fire: Use ... to extinguish.
P405	Store locked up
P403+P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

Signal Word: Danger

Acute Toxicity

N/A

Conditions Aggravated

N/A

Chronic Effects

N/A

Section 3 - Composition / Information on Ingredients

Chemical Name	CAS number	Weight Concentration %
Distillates, petroleum, light distillate hydrotreating process, low-boiling	68410-97-9	36.00%
Stoddard solvent	8052-41-3	31.00%
Naphtha, petroleum, hydrotreated light	64742-49-0	27.00%
1,3-Butadiene, 2-methyl-, homopolymer	9003-31-0	2.00%
Trimethylbenzene	25551-13-7	1.00% - 5.00%
Titanium (IV) dioxide	13463-67-7	1.00% - 5.00%
Isopropylbenzene	98-82-8	0.10% - 1.00%

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Section 4 - First Aid Measures

INHALATION - Move affected person to fresh air, rest in a half upright position, and loosen clothing. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Seek medical advice after significant exposure.

EYE CONTACT - Flush with large amounts of water for at least 15 minutes. Lift eyelids occasionally. Get prompt medical attention.

SKIN - Wash thoroughly with soap and water immediately. Remove all contaminated clothing immediately. Seek medical advice if irritation persists.

INGESTION - Seek medical advice. The decision to induce vomiting or not must be made by a physician after careful consideration of all matterials ingested. Risk of aspiration into lungs.

Section 5 - Fire Fighting Measures

Suitable Extinguishing Media

Carbon Dioxide---Dry Chemical---Foam---Water Fog
Use water for cooling material stored in vicinity of fire.

Explosion Hazards

Vapors are heavier than air and may travel along the ground to an ignition source some distance from material handling point. Ignition sources include pilot lights, smoking, heaters, electric motors, sparks from electrical switches and static discharges.

CAUTION: Never use cutting torch on empty containers! Residual solvent vapor in empty container may explode. Application to hot surfaces requires special precautions. During emergency conditions, overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain Medical Attention.

Hazardous Combustion Products

N/A

Recommended Fire Equipment

Use self-contained breathing apparatus with a full-face piece operated in a pressure-demand or other positive pressure mode. Wear protective clothing.

Section 6 - Accidental Release Measures

Non-emergency personnel: Evacuate and isolate the area and prevent access. Remove ignition sources. No flares, smoking or flames in hazard area. Notify management. Avoid breathing vapor or mist and put on protective equipment. Control source of the leak. Ventilate.

Emergency responders: See section 8 for any specialized clothing recommendations. Also reference the information for non-emergency personnel

Environmental precautions: Prevent further leakage or spillage if possible. Do not allow the material to spread to drains, sewers, water supplies, or soil. Contact APV (**330-773-8911)** for assistance and advice.

Small Spill: Stop leak if possible and move containers from the spill area. Water soluble: dilute with water and

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mop up. Water Insoluble: Cover spill area with a suitable absorbent inert material (Kitty Litter, Oil-Dri, etc.) and dispose of in an appropriate metal waste container. Dispose of material through a licensed waste disposal contractor.

Large Spill: Stop leak if possible and move containers from the spill area. Approach release from upwind. Contain spillage and with non-combustible absorbent material and place in appropriate disposal container according to local regulations. Dispose of material through a licensed waste disposal contractor. Report spill to appropriate governing agencies if applicable.

APV requires that CHEMTREC be immediately notified (**800-424-9300**) when this product is unintentionally released from its container during its course of distribution, regardless of the amount released. Distribution includes transportation, storage incidental to transportation, loading and unloading. Such notification must be immediate and made by the person have knowledge of the release.

Section 7 - Handling and Storage

Precautions for Safe Handling

Keep away from food, drink and heat. Keep away from sources of ignition. No smoking. Do not breathe vapor. Avoid contact with skin and eyes. Never use pressure to empty. Take precautionary measures against static discharges.

Storage temperature-
- Minimum: do not freeze
- Maximum: 40°C (104°F)

Storage Period- See technical data sheet.

Section 8 - Exposure Controls / Personal Protection

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Distillates, petroleum, light distillate hydrotreating process, low-boiling 68410-97-9	Not Established	Not Established	Not Established
Stoddard solvent 8052-41-3	500 ppm TWA; 2900 mg/m3 TWA	100 ppm TWA	NIOSH: 350 mg/m3 TWA 1800 mg/m3 Ceiling (15 min)
Naphtha, petroleum, hydrotreated light 64742-49-0	Not Established	Not Established	Not Established
1,3-Butadiene, 2-methyl-, homopolymer 9003-31-0	Not Established	Not Established	Not Established
Trimethylbenzene 25551-13-7	N/A	25 ppm TWA	N/A
Titanium (IV) dioxide 13463-67-7	15 mg/m3 TWA (total dust)	10 mg/m3 TWA	N/A
Isopropylbenzene 98-82-8	50 ppm TWA; 245 mg/m3 TWA	50 ppm TWA	NIOSH: 50 ppm TWA; 245 mg/m3 TWA

Engineering Controls: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation, or other controls to keep air containment concentration below current applicable OSHA permissible exposure limit or ACGIH TLV limit, and volatiles below lower explosive limit. Heavy solvent vapors should be removed from the lower

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levels of area, and all ignition sources (non-explosion proof equipment) should be eliminated if flammable mixtures will be encountered. Remove decomposition products formed during welding or flame cutting of surfaces coated with this product. For baking finishes - vent vapors emitted on heating.

Environmental Controls: Emissions should comply with environmental protection legislation.

Individual Protection Measures:

Hygiene measures- Wash hands, forearms, etc. after handling chemical products, before eating, smoking, and using the lavatory, and the end of the work period. Use appropriate techniques when removing potentially contaminated clothing and wash before reusing. Know the locations of eyewash and safety showers.

Respiratory Protection- Provide adequate ventilation to keep exposure below permissible limits. If a risk assessment deems necessary, operator is to use a properly fitted, air purifying or supplied air respirator. Respirator selection must be based on known/ anticipated exposure levels, the hazards of the product, and the safe working limits of the respirator.

Skin and Body Protection- Wear chemical resistant gloves (nitrile) and paint suits when necessary, based on risk assessment. The most suitable glove must be chosen in consultation with the gloves supplier who can inform about the breakthrough time of the glove material. PPE for the body should be selected based on the risks of the task being performed and approved by a specialist. Appropriate footwear should also be approved.

Eye/Face Protection- Wear approved chemical safety goggles where exposure to vapor or contact with eyes is possible. Eye wash stations should also be made available. If inhalation hazard exists, a risk assessment will determine if a full face respirator may be required

Section 9 - Physical and Chemical Properties

Information on basic physical and chemical properties:

Evaporation Rate (nBuAc=1):	Not determined	**Vapor Pressure:**	2.7 mmHg
Vapor Density:	3.9	**Freezing Point:**	Not determined
Partition coefficient:	Not determined	**Viscosity:**	Not determined
pH:	N/a	**% Weight Solids**	4.08
% Volume Solids	2.43	**VOC Wt/Gal (wet)**	6.12
U.S. VOC Wt/Gal (wet)	6.12	**Specific Gravity (SG)**	0.765
Odor:	Hydrocarbon	**Odor Threshold:**	Not determined
Color:	Yellow	**Boiling Point:**	150°C
Flash Point:	32°F,0°C	**LEL/UEL:**	N/A
Autoignition Temperature:	226°C		

Section 10 - Stability and Reactivity

Stability and reactivity profile

This material is unstable

Hazardous polymerization will not occur.

The following materials should be avoided in contact with the mixture

Oxidizing agents
Strong acids

Hazardous decomposition products

Titanium/titanium oxides

Section 11 - Toxicological Information

Mixture Toxicity

Oral Toxicity LD50: 4,557mg/kg
Dermal Toxicity LD50: 3,166mg/kg

Component Toxicity

68410-97-9	Distillates, petroleum, light distillate hydrotreating process, low-boiling Oral LD50: 5,000 mg/kg (Rat) Dermal LD50: 2,000 mg/kg (Rabbit) Inhalation LC50: 3,367 ppm (R
64742-49-0	Naphtha, petroleum, hydrotreated light Oral LD50: 2,000 mg/kg (Rat) Dermal LD50: 2,000 mg/kg (Rabbit)

LC_{50} and LD_{50} toxicity for this product are merely estimates and have yet to be determined. For individual component ecotoxicity, please refer to Section 11.

Possible Routes of Entry

Inhalation Skin Contact Eye Contact Ingestion

Potential Target Organs

Eyes Kidneys Central Nervous System Skin Respiratory System

Effects of Overexposure

Not Available

The following components are possible carcinogens

***Materials labeled a carcinogen in dust form are supplied in solution, thus eliminating the hazard.**

CAS Number	Description	% Weight	Carcinogen Rating
64742-49-0	Naphtha, petroleum, hydrotreated light	27	Naphtha, petroleum, hydrotreated light: EU REACH: Present (P)
98-82-8	Isopropylbenzene	0.1 to 1.0%	Isopropylbenzene: IARC: Possible human carcinogen OSHA: listed
8052-41-3	Stoddard solvent	31	Stoddard solvent: EU REACH: Present (P)
13463-67-7	Titanium (IV) dioxide	1 to 5%	Titanium (IV) dioxide: (*dust) NIOSH: potential occupational carcinogen IARC: Possible human carcinogen OSHA: listed
68410-97-9	Distillates, petroleum, light distillate hydrotreating process, low-boiling	36	Distillates, petroleum, light distillate hydrotreating process, low-boiling: EU REACH: Present (P)

Section 12 - Ecological Information

Mixture Ecotoxicity

Toxicity- Do not release into environment. May cause long term adverse effects.
Persistence and degradability- N/A

Bioaccumulative potential- N/A
Mobility in Soil- N/A

Component Ecotoxicity

Trimethylbenzene	96 Hr LC50 Pimephales promelas: 7.72 mg/L [flow-through]
Isopropylbenzene	96 Hr LC50 Pimephales promelas: 6.04 - 6.61 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 4.8 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 2.7 mg/L [semi-static]; 96 Hr LC50 Poecilia reticulata: 5.1 mg/L [semi-static] 48 Hr EC50 Daphnia magna: 0.6 mg/L; 48 Hr EC50 Daphnia magna: 7.9 - 14.1 mg/L [Static] 72 Hr EC50 Pseudokirchneriella subcapitata: 2.6 mg/L

Section 13 - Disposal Considerations

Dispose of in accordance with federal, state and local regulations. Controlled incineration is recommended for disposal of unused product. Prevent contamination of soil, drains and surface waters. Dispose of large containers to a licensed reconditioner. Dispose of small containers in compliance with local regulations.

Section 14 - Transport Information

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
DOT	Printing Ink	UN1210	II	3
IATA	Printing Ink Pkg Instr: Y341/353/364	UN1210	II	3
IMDG	Printing Ink EmS: F-E, S-D	UN1210	II	3

Section 15 - Regulatory Information

The following chemicals are listed in Californa Title 8 CCR Sections as Hazardous Substances
- 98-82-8 Isopropylbenzene
- 25551-13-7 Trimethylbenzene
- 8052-41-3 Stoddard solvent

The following chemicals are listed in Californa Title 8 CCR Sections 5200-5220 as Carcinogens .
- None

The following chemicals are listed in Californa Title 8 CCR Section 5203 as Carcinogens
- None

The following chemicals are listed in Californa Title 8 CCR Section 5209 as Carcinogens .
- None

The following chemicals are listed in the EU-Substances of Very High Concern (2008/67/ED) (SVHC):
- None

The following chemcials are listed in the EU-Restriction of the use of certain Hazardous Substances (2011/65/EU) (RoHS):
- None

The following chemicals are included in the Global Automotive Declarable Substance List (GADSL)
- None

The following substances are required for notification by the Japanese Enforcement Order of the Industrial Safety and Health Law (ISHL):
- 98-82-8 Isopropylbenzene
- 13463-67-7 Titanium (IV) dioxide

25551-13-7 Trimethylbenzene
64742-49-0 Naphtha, petroleum, hydrotreated light
8052-41-3 Stoddard solvent

The following chemicals are listed on the Massachusetts Right-to-Know Hazardous Substances List.
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed on the New Jersey Right-to-Know Hazardous Substances List.
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed on the Pennsylvania Right-to-Know Hazardous Substances List.
98-82-8 Isopropylbenzene
13463-67-7 Titanium (IV) dioxide
25551-13-7 Trimethylbenzene
8052-41-3 Stoddard solvent

The following chemicals are listed by the State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):
98-82-8 Isopropylbenzene 0.1 to 1.0 % Carcinogen
13463-67-7 Titanium (IV) dioxide 1 to 5 % Carcinogen

Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires certain facilities manufacturing, processing, or otherwise using listed toxic chemicals to report their environmental releases of such chemicals annually. The following chemicals are listed:
98-82-8 Isopropylbenzene 0.1 to 1.0 %

The following chemicals are listed in EPCRA (SARA) Section 313: Persistent, Bioaccumulative, and Toxic Chemicals (PBT)
- None

The following chemicals are listed under EPCRA (SARA) Section 313: Toxic Release Inventory (TRI)
- None

Under Section 12(b) of the Toxic Substances Control Act (TSCA), exporters may need to notify the U .S. Environmental Protection Agency if they export or intend to export a product containing a chemical substance that is present on this list. The following substances are containted within this material:
- None

The following chemicals are listed as a *Hazardous Air Pollutant* under listed under the U.S. CAA (Clean Air Act)
98-82-8 Isopropylbenzene

Country	Regulation	All Components Listed
Canada	Canadian Domestic Substances List (DSL)	Yes
Canada	Canadian Non-Domestic Substances List (NSDL)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Europe	REACH Registered or Pre-Registered Substances and Intermediates	Yes
Japan	Japanese Inventory of Existing and New Chemical Substances (ENCS)	No
Japan	Japan Inventory of Industrial Saftey and Health Law Substances (ISHL)	No
Korea	Korean Existing Chemical Inventory (KECI)	Yes
New Zealand	New Zealand Inventory of Chemicals (NZIoC)	Yes

Public Version - Trade Secret Information Redacted

Philippines	Philippines Inventory of Chemicals and Chemical Substances (PICCS)	Yes
USA	Toxic Substances and Control Act (TSCA)	Yes

EU Risk Phrases

Not Available

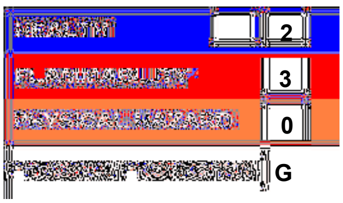
Safety Phrase

Not Available

Section 16 - Other Information

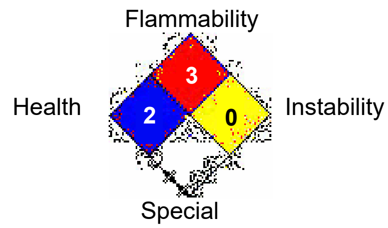
NFPA and HMIS use a numbering scale ranging from 0 to 4 to indicate the degree of hazard. A value of zero means that the substance possesses essentially no hazard; a rating of four indicates extreme danger. Although similar, the two rating systems are intended for different purposes, and use different criteria. The NFPA system was developed to provide an on-the-spot alert to the hazards of a material, and their severity, to emergency responders. The HMIS system was designed to communicate workplace hazard information to employees who handle hazardous chemicals.

Hazardous Material Information System (HMIS)



HMIS & NFPA Hazard Rating Legend
*** = Chronic Health Hazard**
0 = INSIGNIFICANT
1 = SLIGHT
2 = MODERATE
3 = HIGH

National Fire Protection Association (NFPA)



The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Date revised: 2015-06-12

Date Prepared: 6/4/2019

Revision No: 1

Reviewer ID: pbluman

REVISED BACT NARRATIVE FOR MIXING

From the Mixing Source 05 BACT Analysis. **Step 2:** Eliminate infeasible options. Beginning on page 8.

Because other tire plants have installed RTOs for mixing, BATO considered RTOs on each of the 4 new mixers with a proportional amount of silane usage for each mixer. A second scenario considered was installing 2 larger RTO's on 2 pairs of new mixers each using a proportional amount of silane per year. It's possible that particulate in the exhaust of the mixers would blind a concentrator wheel; however, BATO has considered the option to install a combined system in series that would accept all exhausts from the 4 new mixers in the concentrator wheel(s) and exhaust to a single RTO. Another configuration that was considered was a system exhausting 4 new mixers and 2 existing mixers to three concentrator wheels in series with a single RTO. Each of these configurations shows a BACT control cost >$8,000/ton VOC Emissions avoided as shown in Appendix B. Any configuration over $8,000 per ton of emissions avoided can be considered economically infeasible according to other BACT references for this industry. In addition, BATO considered the option to install an RTO on 2 of the new mixers and assumed that these 2 mixers would be selected to process all Silane for the facility. The BATO Warren permit does not currently limit how each of its mixers is used. Tread can be mixed in any mixer. Flexibility in operations is needed in the plant and critical to allow the capability to be able to mix any type of rubber compound in any mixer and to be able to use the tire "recipe" components necessary to produce the types of tires their customers demand. This flexibility is necessary to be able to reach the design capacity. The type and amount of silane used in BATO's tires has changed over time and BATO has experienced an increase in demand for tires that are manufactured using silane. Silane is added during the tread mixing process in order to impart certain characteristics to the rubber (tread) being mixed. Ethanol is emitted as the silane reacts with the rubber compound in the presence of high temperature and moisture. BATO has not evaluated the resultant cost that would also be incurred from redesigning the mixing process so that only certain mixers are used for mixing activities with higher VOC emissions potential using silane.

We do not believe that redesigning or constraining the process in that way is required as part of a BACT analysis, and it would limit the overall production capability of the plant. Continued operational flexibility and lack of restriction on product flow within the plant is vital to maintaining BATO's current production rates and product quality. As requested, BATO has reviewed the cost analysis that was submitted previously. It was found that an inconsistency existed in the length of the ductwork estimated for the configuration of a single 30,000 CFM RTO for a single Mixer and the length of ductwork estimated for the configuration of two RTOs serving two pairs of mixers. Each RTO in this scenario would control about 64,000 CFM of air exhausted to each of the two RTOs. In the case of the single RTO controlling a single Mixer, a low estimate of 30 feet of ductwork was previously used. A more accurate figure would be at least 1,000 feet of ductwork according to BATO's engineering team. The mixers are configured vertically within the production plant with material being added to day bins on the third floor. mixing occurs on the mezzanine between floors 2 and 3. An exhaust duct for VOC emissions from Mixing operations would need to be routed out and around day bins on the 3rd floor. Then, the roof does not have sufficient room for an RTO with the dust collectors, and high heat from the RTO would cause combustible dust hazards if located next to the mixing dust control equipment. Exhaust would need to be ducted a significant distance away from the mixing operations, and 1,000 feet is a low estimate. For consistency, we considered 1,000 feet of ductwork the same for the second configuration of the two larger RTOs controlling two pairs of mixers. Larger ductwork for this configuration would incur higher costs, but this small increase was not considered. Lastly, another update was made to include a lower, more reasonable equipment cost estimate from an RTO equipment manufacturer for the RTOs sized for 64,000 CFM. The equipment cost for the RTO rated for 30,000 CFM is $875,000, and the updated equipment cost for the RTO rated at 64,000 CFM is $1,257,000. A review of the cost of each of these configurations mentioned above proved to be excessive (>$8,000 per ton of VOC emissions avoided) as shown in the attached summary sheets.

Step 3 and 4: Rank remaining control technologies by control effectiveness and evaluate the most effective controls and document results.

Based on this analysis, mixing emissions would be most effectively controlled by an RTO; however, this add-on control technology is not economically feasible based on the cost to install and operate the equipment. All other add-on control technologies listed are considered not technically feasible. Best work practices have been chosen as the best alternative to add-on control technologies for VOC emissions from Mixing.

Warren County Expansion - BACT Info

Mixer - VOC Control of Baghouse Exhaust

	RTO Size - CFM	30,000 CFM	64,000 CFM
Annual cost of RTO per 620 or 320 Mixers		$821,617	$1,235,675

Total No. of Mixers
9

Mixer	RTO Size - CFM (individual RTO on each Mixer)	RTO Size - CFM (RTO on each pair of Mixers)	Rate of Production (tires per day)	Total Rubber VOC from All Mixers (tpy)	Tires per day with Silane	Total EtOH from Silane from Mixers (tpy)	Rubber VOC and EtOH from Silane Mixers (tpy)	% Capture VOC to RTO	No. of RTOs	Annual Cost of RTO for Mixer Exhausts	Annual Cost of RTO for Pairs of Mixer Exhausts	Control Eff of RTO	Mixers VOC After Control (tpy)	Avoided (tpy)	Individual RTO's for each mixer $/ton avoided emissions	RTO's installed each Pair of Mixers $/ton avoided emissions
626	31,659	63,318	13,640	18.44	13,640	162.17	20.07	85%	1	$821,617	$1,235,675	98%	3.4	16.7	$49,149	$36,959
627	31,659						20.07	85%	1	$821,617		98%	3.4	16.7	$49,149	
328	31,659	63,318					20.07	85%	1	$821,617	$1,235,675	98%	3.4	16.7	$49,149	$36,959
329	31,659						20.07	85%	1	$821,617		98%	3.4	16.7	$49,149	

	RTO Size - CFM	Rubber VOC - 2 mixers	Tires per day with Silane	Total EtOH from Silane from Mixers (tpy)	Rubber VOC and EtOH from Silane Mixers (tpy)	% Capture VOC to RTO	No. of RTOs		Annual Cost of RTO for Pairs of Mixer Exhausts	Control Eff of RTO	Mixers VOC After Control (tpy)	Avoided (tpy)	Single RTO Installed on just two Mixers $/ton avoided emissions
Two Mixers are selected to proccess all Silane for the facility	63,318	4.10	13,640	162.17	166.27	85%	1		$1,235,675	98%	27.8	138.5	$8,922

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse (620 or 320 mixer) =	30,000 scfm		Vent one mixer to a single RTO
Direct Costs		**Cost**	**Cost Factor/Comments**
Purchased Equipment Costs			
Equipment Cost (EC)orig		$612,100	Durr Estimate in 8.9.2019 Email
Equipment Cost (EC)updated[1]		$875,000	Durr Estimate updated in 01.09.2023 Email
Freight	0.05*EC	$43,750	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)
Taxes	0.03*EC	$26,250	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)
Instrumentation	0.10*EC	$87,500	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)
Total Purchased Equipment Costs (PEC) =		$1,032,500	Scaled this to a 2022 Basis using the Chemical Engineering plant cost index
Direct Installation Costs			
Foundations and Supports	0.08*PEC	$82,600	Table 2.8 of the OAQPS Control Cost manual
Handling and Erection	0.14*PEC	$144,550	Table 2.8 of the OAQPS Control Cost manual
Electrical	0.04*PEC	$41,300	Table 2.8 of the OAQPS Control Cost manual
Piping	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Insulation for Ductwork	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Painting	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Site Preparation		Unknown	(unknown at this time)
Retrofit Factor		$0	Control Equipment Installed on new mixers
Total Direct Installation Costs (DC) =		$309,750	
Indirect Installation Costs			
Engineering	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Construction and Field Expenses	0.05*PEC	$51,625	Table 2.8 of the OAQPS Control Cost manual
Contractor Fees	0.10*PEC	$103,250	Table 2.8 of the OAQPS Control Cost manual
Start-up	0.02*PEC	$20,650	Table 2.8 of the OAQPS Control Cost manual
Performance test	0.01*PEC	$10,325	Table 2.8 of the OAQPS Control Cost manual
Contingencies	0.03*PEC	$30,975	Table 2.8 of the OAQPS Control Cost manual
Total indirect Installation Costs (IC) =		$320,075	
Total Installed Cost (PEC + DC + IC) =		$1,662,325	
Ductwork			Based on new control device west of mixing building
	1000 feet	$987,956	Reference 2, scaled
Total Capital Cost (TCC)	TCC =	**$2,650,281**	

Direct Annual costs		**Cost**	**Cost Factor/Comments**
Electricity Cost	39 kW for fan	$14,560	Elec. Cost= $0.0425 0.0425 $/kWh Warren Co T. Burnett email 12.28.2022 Operation= 8,760 hr/yr
Fuel Cost		$182,313	Fuel use 33,974 MMBtu/yr gas cost $ 5.37 /MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor			
Operator	1 hr/shift	$36,474	
$	33.31 /hr		T. Burnett email 12.28.2022
Supervisor		$5,471	15% of operating labor, Reference 3
Maintenance	1 hr/shift	$41,435	
Labor $	37.84 /hr		T. Burnett email 12.28.2022
Material		$41,435	100% of maintenance labor, Reference 3
Indirect Annual Costs			Reference 3 Table 2.10
Overhead		$74,889.13	0.6 * C C = operating labor + maintenance costs
Administration		$23,850	2% TCC
Property Taxes		$11,925	1% TCC
Insurance		$11,925	1% TCC
Interest Rate	7.00%		
Years for Loan	10		
Capital Recovery (Annualized Capital Cost)		$377,340.33	
Total Annual Cost		**$821,617**	

Basis:
1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 30,000 scfm based on controlling a single Mixer in August 2019.
They additionally provided a second budgetary cost estimate for an individual RTO rated for 30,000 scfm to control a single Mixer in January 2023.
2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)
3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.

REGENERATIVE THERMAL OXIDATION CONTROL COSTS FOR MIXING
BRIDGESTONE WARREN CO

Air flow rate for baghouse (620 or 320 mixer) x 2 =		64,000 scfm	Vent two mixers to a single RTO		
Direct Costs		**Cost**	**Cost Factor/Comments**		
Purchased Equipment Costs					
Equipment Cost (EC) from manufacturer[1]		$1,257,000	Durr Estimate updated in 01.09.2023 Email		
Freight	0.05*EC_b	$62,850	Table 2.8 of the OAQPS Control Cost manual (0.05 * Equip cost)		
Taxes	0.03*EC_b	$37,710	Table 2.8 of the OAQPS Control Cost manual (0.03 * Equip cost)		
Instrumentation	0.10*EC_b	$125,700	Table 2.8 of the OAQPS Control Cost manual (0.1 * Equip cost)		
Total Purchased Equipment Costs (PEC) =		$1,483,260			
Direct Installation Costs					
Foundations and Supports	0.08*PEC	$118,660.80	Table 2.8 of the OAQPS Control Cost manual		
Handling and Erection	0.14*PEC	$207,656	Table 2.8 of the OAQPS Control Cost manual		
Electrical	0.04*PEC	$59,330.40	Table 2.8 of the OAQPS Control Cost manual		
Piping	0.02*PEC	$29,665	Table 2.8 of the OAQPS Control Cost manual		
Insulation for Ductwork	0.01*PEC	$14,833	Table 2.8 of the OAQPS Control Cost manual		
Painting	0.01*PEC	$14,833	Table 2.8 of the OAQPS Control Cost manual		
Site Preparation		Unknown	(unknown at this time)		
Retrofit Factor = 0%		$0	Control Equipment Installed on new mixers factor of up to 50% is appropriate - so this is conservative to assume $0		
Total Direct Installation Costs (DC) =		$444,978			
Indirect Installation Costs					
Engineering	0.10*PEC	$148,326	Table 2.8 of the OAQPS Control Cost manual		
Construction and Field Expenses	0.05*PEC	$74,163	Table 2.8 of the OAQPS Control Cost manual		
Contractor Fees	0.10*PEC	$148,326	Table 2.8 of the OAQPS Control Cost manual		
Start-up	0.02*PEC	$29,665	Table 2.8 of the OAQPS Control Cost manual		
Performance test	0.01*PEC	$14,833	Table 2.8 of the OAQPS Control Cost manual		
Contingencies	0.03*PEC	$44,498	Table 2.8 of the OAQPS Control Cost manual		
Total indirect Installation Costs (IC) =		$459,811			
Total Installed Cost (PEC + DC + IC) =		$2,388,049			
Ductwork	1000 feet	$987,956	Based on new control device west of mixing building Reference 2, scaled		
Total Capital Cost (TCC)	TCC =	**$3,376,004**			
Direct Annual costs		**Cost**	**Cost Factor/Comments**		
Electricity Cost	83 kW for fan	$31,061	Elec. Cost=	$0.0425	0.0425 $/kWh Warren Co 2022 cost T. Burnett email 12.28.2022
			Operation=	8,760	hr/yr
Fuel Cost		$389,203	Fuel use	72,477	MMBtu/yr
			gas cost $	5.37	/MMBtu 2022 Warren Co gas cost T. Burnett email 12.28.2022
Operating Labor					
Operator	1 hr/shift	$36,474			
$	33.31 /hr		T. Burnett email 12.28.2022		
Supervisor		$5,471	15% of operating labor, Reference 3		
Maintenance	1 hr/shift	$41,435			
Labor $	37.84 /hr		T. Burnett email 12.28.2022		
Material		$41,435	100% of maintenance labor, Reference 3		
Indirect Annual Costs			Reference 3 Table 2.10		
Overhead		$74,889.13	0.6 * C		C = operating labor + maintenance costs
Administration		$67,520	2% TCC		
Property Taxes		$33,760	1% TCC		
Insurance		$33,760	1% TCC		
Interest Rate	7.00%				
Years for Loan	10				
Capital Recovery (Annualized Capital Cost)		$480,667.04			
Total Annual Cost		**$1,235,675**			

Basis: **1) Durr Systems Inc. provided a budgetary cost estimate for an individual RTO rated for 60,000 scfm based on controlling Mixing sources in January 2023.**

2) Cost Estimate for 720 LF of 36" duct (pipe) and structural steel supports is $711,328 per David Lynch, AECOM Principal Process Engineer, May 2016. (Includes Installation and Materials)

3) EPA OAQPS Air Pollution Control Cost Manual (6th edition), January 2002, Section 3.2, Chapter 2.