CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU

Statement of Basis
Part 70 Permit No. 47-065-0122

Astec Industries, Inc.
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Emission Unit No.	Description
001	Blast Cleaning Technologies Shot Blasting Machine
002	Surface Coating Operations
003	Production Burner Testing
004	Seven Plasma Cutting Tables
005	Stainless Steel Welding Operations
006	Laguna Rubber Cutting Table
007	Cummins Emergency Generator Engine

Purpose

Astec Industries, Inc., has applied for renewal of their Part 70 (Title V) permit. This company name is registered as an active entity with the Tennessee Secretary of State. This renewal includes overall decreases in allowable emissions of 30.0 tons/yr for hazardous air pollutants (HAPs) and 3.81 tons/yr for particulate matter (PM). This statement of basis includes discussions of the operation of the permitted equipment, the air pollutant emissions, and the applicable regulations. It has been adapted from the Bureau annual inspection report for Astec dated December 21, 2022.

Process Description

Astec Industries, Inc., manufactures drum and batch mix asphalt plants, soil remediation units, asphalt emulsion plant components, and burners to be used in its asphalt plants. The facility operates a standard steel fabrication shop with capabilities for steel cutting, bending, welding, and component assembly.

Steel components are prepared prior to painting by a Blast Cleaning Technologies shotblast machine. Particulate matter (PM) emissions from this shotblast machine are controlled by a baghouse. PM emissions from the eight plasma cutters are also controlled by baghouses. Volatile organic compound (VOC) emissions are uncontrolled from the surface coating operations but PM

emissions from this process are controlled by dry filters. As a miscellaneous metal parts coating operation, Astec Industries, Inc., entered into the Docket 582 agreement limiting the maximum amount of VOC in the coatings to a daily average of 3.5 lb/gal.

The Blast Cleaning Technologies shotblast machine is used to remove scale and other surface corrosion from plate and structural steel. The shotblast machine is controlled by a 22,000 cfm Astec pulse-jet baghouse. The removed impurities are extracted from the shot recovery unit and cycled to the baghouse. Material recovered by the baghouse is deposited in an enclosed container and sent to the landfill. Both a Wheelabrator shot blasting machine and a Blastec shot blasting machine have been removed.

The seven plasma cutting tables and the stainless steel welding operation are used to turn the shotblasted steel plates into the various components of the burners. The plasma cutting tables emit PM that is controlled by a baghouse. Stainless steel welding emits PM, with a portion of that being hexavalent chromium (chromium VI), which is a hazardous air pollutant (HAP).

A coating building includes four DeVilbiss paint spray booths. Three large booths are used for coating large components and nearly complete units. A smaller booth is used to spray smaller components. A Burner Group paint spray booth is used for coating burners.

The air filter system for the coating building is designed for balance of the flow on either side of the filter bank. The system fans are operated at a constant speed and an adjustable air damper is located on the exhaust side of the system to achieve the desired balance. Pressure drop across each filter system is monitored with the integral DeVilbiss instrumentation. The entire bank of filters is changed when the system cannot be adjusted to the acceptable range. Historically, a set of filters lasts about two months. The Burner Group paint booth is operated similarly. The pressure drop across the filters is monitored and the filters are changed when it falls outside the specified manufacturer's range.

The Laguna rubber cutting table is used to cut rubber pieces for the burners from rolls of rubber. PM emissions from this cutting table are controlled by a baghouse.

Astec conducts production tests of some of the burners it makes before shipping the burners to its customers. These tests consist of several firings of about five minutes each with a total firing time of about 30 minutes per burner. Natural gas, #2 fuel oil, recycled fuel oil, liquid propane, and coal are the allowed fuels for these tests.

Astec uses an emergency generator to provide electric power to the offices in the event of a power loss. This generator is powered by a Cummins engine. This internal combustion engine is fueled exclusively by ultra-low sulfur diesel fuel (No. 2 fuel oil). It is operated periodically for test purposes, and uncontrolled emissions result from fuel combustion in it.

Evaluation

Emission Unit 001 Blast Cleaning Technologies Shot Blasting Machine

The Blast Cleaning Technologies shot blasting machine was installed in November of 2017 and is subject to §4-41 Rule 27.1 [best available control technology (BACT) PM emissions] of the Ordinance. This operation is well controlled with the integral baghouse and the descaling shot being applied in an enclosed area. An appropriate PM emission limit for the shotblast machine is 0.50 lb/hr. Maintenance of the baghouse is performed per the company's maintenance plan.

Estimated PM emissions are based on baghouse drop-out dust accumulated over a representative time period. Dust capture was determined to be 1,512 pounds during 22.5 hours of run time. This yields an hourly PM capture rate of 67.2 lb/hr. With a baghouse PM control efficiency of 99.5%, the result is an emission rate of 0.338 lb/hr of controlled emissions. Emissions were estimated using this emission rate, approximately 15 hours of blasting per day, 7 days a week, and 50 weeks per year.

Emission Unit 002 Surface Coating Operations

The spray booths were installed in April of 1993 and are subject to §4-8(e)(2)b (BACT PM emissions), §4-41 Rules 3 (visible emissions) and 25 (BACT VOC emissions) of the Ordinance and 40 CFR Part 63, Subpart MMMM. The spray booths were operated for two 8-10 hour shifts a day, 5 days a week for 50 weeks, and about 15 weekends in calendar year 2021. Painting is performed for about 3-4 hours during each shift (~1,960 hours in 2021). Each booth is equipped with a flow balance adjustment and analog indicator. The indicator displays a range of differential pressure (ΔP) across the system. When the ΔP cannot be adjusted to the acceptable range the entire bank of filters is changed. Air make-up (suction) in each of the large booths remains constant at 55,000 scfm. Exhaust flow is controlled by damper adjustment to balance the system and ensure optimum filter system performance. Estimated particulate emissions are given in Table 1 and are based on the aforementioned data, assuming an overspray of 25% and a dry filter efficiency of 98.5%. Air make-up units can be used to provide heat to speed up curing of the applied coatings. The large booths each have three such units at 1.0 MMBtu/hr each for a total of 3.0 MMBtu/hr per large booth, and the fourth smaller booth has just one unit for a total of 1.0 MMBtu/hr. The Burner Group booth does not have any heating capability.

As a miscellaneous metal parts coating operation, Astec entered into an agreement (Docket 582.01) on February 1, 1989 to limit the amount of VOC present in its coatings to a daily average of 3.5 lb/gal as applied. These VOC limits originally prevented Astec from reaching the 100 tons/yr threshold for lowest achievable emissions rate (LAER) application, and also provided a BACT limit. Astec is subject to the "National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products" [40 CFR Part 63, Subpart MMMM (§63.3880–63.3981)], as adopted at Rule 16.5(c), and has worked with their coating supplier to get coatings that will allow the company to comply with the this subpart through the emission rate

without add-on controls option. This means that Astec uses coatings that on average do not exceed 2.6 pounds of organic HAPs per gallon of coating solids. Of the total VOC emissions resulting from coating constituents, several of these are listed as Title III HAPs. Estimated emissions are listed in the following Table 2. Estimated emissions are based on coatings and related materials usage for calendar year 2021.

Emission Unit 003 Production Burner Testing

Proof testing of production burners of a variety of size burners up to 200 MMBtu/hr is conducted prior to shipment of the burners. Production burner testing has been previously determined to be fuel burning equipment. Production burner testing is subject to §4-41 Rule 13.2 (sulfur dioxide or SO_2), Rule 25.3 (BACT VOC emissions), and Rule 27.3 for PM and visible emissions (reasonable and proper). Rule 2.1, which limits nitrogen oxides (NO_X) emissions from fuel burning equipment, does not apply because the maximum burner capacity is below the rule threshold. An appropriate Rule 25.3 BACT limitation for the VOC emissions from production burner testing has been previously determined to be 1.0 tons/yr. This VOC emission limit is met by limiting the types of fuel that may be burned to natural gas, No. 2 fuel oil, recycled fuel oil, liquid propane, coal, and biomass; and by limiting the amounts of each type of fuel. Rule 13.2 limits SO_2 emissions to 4 lb/MMBtu, which is an appropriate limit when burning coal. This SO_2 emission limit is met by limiting the types of fuel that may be burned, the amounts of each type of fuel, and the sulfur content of the No. 2 fuel oil, recycled fuel oil, and coal. An appropriate Rule 27.3 reasonable and proper limitation for the PM emissions from production burner testing has been previously determined to be 2.0 tons/yr. This PM emission limit is met by limiting the types of fuel that may be burned, the amounts of each type of fuel, and the ash content of the coal. An appropriate Rule 27.3 reasonable and proper limitation for the visible emissions from production burner testing has been previously determined to be a 20% opacity limit, not to exceed five minutes in any one hour period or twenty minutes in any 24 hour period. Emissions from this source are uncontrolled. Estimated emissions are listed in Table 3 and are based on fuel usage for calendar year 2021 and emission factors supplied by Astec and from AP-42.

Emission Unit 004 Seven Plasma Cutting Tables

The PythonX SPG, Messer MMXCEL 10 Global, Messer PMR10-17-6328, Messer Titan 12 4, Messer TMC4500, Whitney 661 ATC, and Messer MMXCEL 6238 plasma cutting tables are subject to §4-41 Rule 27.3 of the Ordinance. PM emissions from the Messer TMC4500 plasma cutter are limited to 0.04 lb/hr, which is considered reasonable and proper in accordance with rule 27.3. Appropriate PM emission limits for the other six plasma cutters are 0.04 lb/hr, 0.10 lb/hr, 0.06 lb/hr, 0.06 lb/hr, 0.06 lb/hr, and 0.06 lb/hr, respectively.

Estimated emissions of PM from the seven plasma cutting tables are given in Table 1. Estimated PM emissions from the plasma cutting tables are based on 5% of the metal being removed during plasma cutting for carbon steel and 7% for stainless steel (*Emission of Fume, Nitrogen Oxides and Noise in Plasma Cutting of Stainless and Mild Steel*, Chapter 12 of AP-42),

a baghouse control efficiency of 99.5%, and various hours of cutting per day for each of the seven plasma cutting tables, 5 days a week, and 50 weeks per year in calendar year 2021.

Emission Unit 005 Stainless Steel Welding Operations

Carbon steel accounts for the bulk of Astec's work, but a small fraction involves stainless steel. For this work, compatible welding materials contain a fraction of chromium. During welding of stainless steel materials, some emissions of hexavalent chromium (chromium VI) result. Once the permit is renewed, Astec will be required to report their total usage quantity of all welding materials containing chromium. Emissions will be calculated based on stainless steel welding material usage and AP-42 emission factors.

While welding is listed on the insignificant activities list in the local ordinance at §4-56(c)(11)(xxii), the section prohibits HAP emissions, which includes chromium VI. Therefore permitting is required. Stainless steel welding is subject to §4-41, Rule 27.3 (reasonable and proper PM emissions). Based on a maximum material usage of 3 lb per hour and an AP-42 emission factor of 3.59 lb of chromium VI emissions per 1,000 lb of material used, an appropriate PM emission limit for chromium VI from stainless steel welding is 0.06 lb/hr. An appropriate emission limit for total PM from stainless steel welding is 0.30 lb/hr.

Emission Unit 006 Laguna Rubber Cutting Table

Testing was conducted to determine if the Laguna rubber cutting table required permitting. The results of that test were 0.4 lb of rubber particulate dust from 20 minutes of operation. With a maximum run time of 30 minutes during one hour due to change overs and cleanup, the potential hourly emissions before controls are 0.6 lb/hr, which requires permitting. The rubber cutting table is therefore subject to §4-41 Rule 27.3 (reasonable and proper PM emissions) of the Ordinance. An appropriate PM emission limit for the rubber cutting table is 0.01 lb/hr.

Estimated emissions of PM from the rubber cutting table are given in Table 1. Estimated PM emissions are based on 0.6 lb/hr of emissions before controls, a baghouse control efficiency of 99.5%, and 10 hours of cutting per day, 5 days a week, and 50 weeks per year in calendar year 2021.

Emission Unit 007 Cummins Emergency Generator Engine

Prior to this renewal, the Cummins emergency generator engine was not included in the Part 70 permit but should have been. It is being added to the permit to correct this omission.

The Cummins emergency generator engine burns diesel fuel at a maximum rate of 4.7 gal/hr (0.644 MMBtu/hr effective rated capacity) and has a maximum power output of 99

horsepower. The diesel fuel that is burned in it has a maximum allowable sulfur content of 15 ppm (0.0015%) by weight.

The Cummins emergency generator engine was manufactured in September of 2006 and is subject to "National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" [40 CFR Part 63, Subpart ZZZZ (§63.6580–63.6675)], as adopted at Rule 16.5(c). §63.6590(c)(1) of this subpart stipulates that the requirements of the subpart are met for the proposed engine by meeting the requirements of "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" [40 CFR Part 60, Subpart IIII (§60.4201–60.4219)], as adopted at Rule 15.1. §60.4205(a) of Subpart IIII stipulate that the engine must meet the emission standards in Table 1 of the Subpart. For this size engine, there is only a standard for NO_X emissions. Recordkeeping requirements are given in §60.4214(b) of Subpart IIII.

§60.4211(f) of 40 CFR Part 60, Subpart IIII, stipulates that the emergency generator engine may be operated without time constraints during emergency situations and up to 100 hr/yr for testing and other specific purposes. This operational limitation is more stringent than the Rule 2.7 limit of 20 days/yr (480 hr/yr) on the operation, during other than emergency situations, of any emergency generator engine that emits more than 1,500 ppm of NO_X. The potential emissions that are given in the preceding table are based upon the Subpart IIII operational limitation.

Potential particulate emissions from the engine based on 8,760 hours of operation are estimated to be 0.874 ton/yr. Therefore, the particulate emissions from the engine are subject to Rule 27.3. An appropriate reasonable and proper limitation, in accordance with Rule 27.3, for these emissions is 0.30 lb/hr. No controls are necessary in order to achieve this limitation. This limitation is more stringent than the Rule 10.3 (Schedule 2) particulate emission limit of 0.283 lb/hr, based on a process weight of 33.135 lb/hr (4.7 gal/hr × 7.05 lb/gal). The Rule 10.7 particulate emission limit of 0.25 gr/scf cannot be converted into units of lb/hr because the exhaust flow rate of the engine is not available at this time.

VOC emissions from the engine are subject to BACT (Rule 25.3). No controls are necessary in order to satisfy BACT for these emissions, and no quantitative BACT VOC emission limitation is necessary.

The emissions of GHGs from the engine are subject to Rule 23. No controls are necessary in order to satisfy reasonable and proper control technology, in accordance with Rule 23, for these emissions, and no quantitative reasonable and proper GHG emission limitation is necessary.

§60.4207(b) of 40 CFR Part 60, Subpart IIII, stipulates that the diesel fuel that is burned in the engine must meet the requirements for nonroad diesel fuel that are given in §1090.305 of "Diesel Fuel and ECA Marine Fuel Standards" [40 CFR Part 1090, Subpart D (§1090.300–1090.325)]. §1090.305(b) of Subpart D limits the sulfur content of this diesel fuel to 15 ppm (0.0015%) by weight. Combustion of diesel fuel with this maximum allowable sulfur content in the engine at its rated capacity results in potential SO_X emissions of 0.001 lb/hr, which is the

effective SO_X emission limitation for the engine. The Rule 13.1 SO_2 emission limit of 500 ppm cannot be converted into units of lb/hr because the exhaust flow rate of the engine is not available at this time.

The estimated potential emissions of particulate, NO_X, CO, VOCs, SO_X, and GHGs (actual and CO_2e) that result from diesel fuel combustion in the engine are given in the following Table 4. Emissions of particulate (considered to be $PM_{2.5}$, PM_{10}, and total), CO, and VOCs were calculated by using an emission factor from AP-42 (1996) Table 3.3-1 (fuel input column). Emissions of NO_X were calculated by using a Subpart IIII emission limit of 9.2 g/(kW·hr) located in Table 1 of the Subpart. SO_X emissions were calculated by using an emission factor from AP-42 (1998) Table 1.3-1. GHG emissions were calculated by using the Tier 1 calculation methodology that is found in §98.33 of 40 CFR Part 98, Subpart C. The emissions are based on operation of the engine at its rated capacity for 100 hr/yr while burning diesel fuel that has the maximum allowable sulfur content. GHG emissions that result from diesel fuel combustion consist mostly of CO_2 and include lesser amounts of methane (CH_4) and nitrous oxide (N_2O).

Table 1 Particulate Matter Emissions

Source	Actual Emissions *tons/yr*	Allowable Emissions *lb/hr*
Shot Blasting Machine	0.844	0.50
Surface Coating Operations	0.046	0.45*
Seven Plasma Cutting Tables	0.461	0.42†
Stainless Steel Welding Operations	---‡	0.30
Laguna Rubber Cutting Table	0.0038	0.01
Cummins Emergency Generator Engine	0.010	0.30
Totals	1.365	1.98

*Combined allowable emissions for all five paint spray booths

†Combined allowable emissions for all seven plasma cutting tables

‡Once the permit is renewed, Astec will be required to report the usage of all welding materials containing chromium. Emissions will be calculated based on this usage and AP-42 emission factors.

Table 2 Emissions of HAPs and VOCs from Surface Coating Operations *(tons/yr)*		
Pollutant	Actual Emissions	Allowable Emissions
Xylenes	9.133	n/a
Ethyl Benzene	2.237	n/a
Manganese compounds	0.001	n/a
Antimony compounds	0.003	n/a
Total HAPs	11.374	30.0
Total VOCs	53.323	90.0

Table 3 Emissions from Production Burner Testing *(tons/yr)*			
Pollutant	Actual Emissions	Potential Emissions	Allowable Emissions
Particulate Matter (Total)	0.008	1.221	2.0
Carbon Monoxide (CO)	0.289	4.191	n/a
Nitrogen Oxides (NO_X)	0.086	1.220	n/a
Sulfur Oxides (SO_X)	0.005	0.880	n/a
Volatile Organic Compounds (VOCs)	0.063	0.988	1.0

Table 4 Emissions from the Cummins Emergency Generator Engine			
Pollutant	Potential Emissions *lb/hr*	*tons/yr**	Allowable Emissions *lb/hr*
Particulate Matter ($PM_{2.5}$, PM_{10}, & Total)	0.200	0.010	0.30
Nitrogen Oxides (NO_X)	1.497	0.075	1.50
Carbon Monoxide (CO)	0.612	0.031	n/a
Volatile Organic Compounds (VOCs)	0.232	0.012	n/a
Sulfur Oxides (SO_X)	0.0010	0.000051	0.001
Actual Greenhouse Gases (GHGs)	105.0	5.251	n/a
GHGs as Carbon Dioxide Equivalents (CO_2e)	105.4	5.268	n/a

*Based on operation for 100 hr/yr

Conclusions

The Blast Cleaning Technologies shot blasting machine (Emission Unit 001) is subject to and in compliance with §4-41, Rule 27.1 (BACT PM and visible emissions) of the Chattanooga Air Pollution Control Ordinance (the Ordinance).

The surface coating operations (Emission Unit 002) are subject to and in compliance with Rule 16.5(c) ("National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products" Title 40 *Code of Federal Regulations* Part 63, Subpart MMMM), Rule 23 (reasonable and proper gaseous emissions), Rule 25.3 (BACT VOC emissions), and Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

Production burner testing (Emission Unit 003) is subject to and in compliance with §4-41, Rule 13.2 (SO_2 emissions), Rule 25.3 (BACT VOC emissions), and Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

The seven plasma cutting tables (Emission Unit 004) are subject to and in compliance with §4-41, Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

The stainless steel welding operations (Emission Unit 005) are subject to and in compliance with §4-41, Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

The Laguna rubber cutting table (Emission Unit 006) is subject to and in compliance with §4-41, Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

The Cummins emergency generator engine (Emission Unit 007) is subject to and in compliance with Rule 15.1 ("Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" Title 40 *Code of Federal Regulations* Part 60, Subpart IIII), Rule 16.5(c) ("National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" Title 40 *Code of Federal Regulations* Part 63, Subpart ZZZZ), Rule 23 (reasonable and proper gaseous emissions), Rule 25.3 (BACT VOC emissions), and Rule 27.3 (reasonable and proper PM and visible emissions) of the Ordinance.

None of the air pollution control equipment at this facility is subject to §4-68(d) ("Compliance Assurance Monitoring" Title 40 *Code of Federal Regulations* Part 64) of the Ordinance.