EPA United States Environmental Protection Agency

OECA – Air Enforcement Division

INSPECTION REPORT

Inspection Date(s):	5/11/22	
Media Program:	Air	
Regulatory Program(s)	Title V	
Company Name:	**Amsted Rail**	
Facility Name:	**Keokuk Facility**	
Facility Physical Location:	416 Carbide Lane	
(city, state, zip code)	Keokuk, IA 52632	
Mailing address:	416 Carbide Lane	
(city, state, zip code)	Keokuk, IA 52632	
County/Parish:	Lee County	
Facility Phone Number	(319) 524-2962 ext. 20712	
Facility Contact:	Joy Jacobson	Environmental Engineer
	jjacobsen@amstedrail.com	
FRS Number:	110000415444	
Identification/Permit Number:	02-TV-014R3	
Media Identifier Number:	IA0000001911100057	
NAICS:	331513, 336510	
SIC:	3325, 3743	

Personnel participating in inspection:		
Nicholas Bobbs	EPA/OECA	CAA Inspector
Luke Rodriguez	EPA/Region 7	CAA Inspector
Joy Jacobsen	Amsted Rail	Environmental Engineer
Robert Ribbing	Amsted Rail	Director – Environmental Services
Corey Jonas	Amsted Rail	General Manager

EPA Lead Inspector Signature/Date	NICHOLAS BOBBS Digitally signed by NICHOLAS BOBBS Date: 2023.05.01 18:17:38 -05'00'	5/1/23
	{Inspector name}	Date
Supervisor Signature/Date	GREGORY FRIED Digitally signed by GREGORY FRIED Date: 2023.05.11 10:20:26 -04'00'	
	{Supervisor name}	Date

Section I – INTRODUCTION

PURPOSE OF THE INSPECTION

EPA inspectors Nicholas Bobbs and Luke Rodriguez arrived at the Amsted Rail Keokuk at 8:30 AM on 05/11/2022 for an unannounced inspection. We met with Joy Jacobson, Environmental Engineer, Corey Jonas, General Manager, and Robert Ribbing, Director of Environmental Services. I presented my credentials to Mr. Jonas and informed him that this was an EPA inspection to determine compliance with the facility's Title V Air Permit and the Clean Air Act. The scope of the inspection is a partial compliance evaluation (PCE).

FACILITY DESCRIPTION

Amsted Rail operates a steel foundry in Keokuk, IA which manufacturers railcar wheels. The facility has approximately 200 employees and operates approximately 6,000 hours per year. The facility operates 24 hours per day for approximately 5 days per week.

Section II - OBSERVATIONS

Facility Tour

We toured the facility while accompanied by Mrs. Jacobson, Mr. Jonas, and Mr. Ribbing.

Melting Area

The facility operates three 22.5-ton electric arc furnaces ("EAF"). Steel scrap is moved by crane into either of the EAFs. The melting process consists of multiple steps; charging (adding scrap to the EAF), melting, (which includes the addition of oxygen and lime) and tapping (removing molten steel from the EAF). The molten steel is transferred to the molding area via ladles on tracks in the basement. A melt cycle is approximately 80 minutes.

EAF #1 was down for maintenance at the time of the inspection. EAFs #2 and #3 were operating. (Photos 1, 2) The inspection team observed the tapping and charging of EAF #2 at approximately 10:00 am. (Photos 3, 4, 5) I observed significant uncaptured PM emissions from the EAF #2 within the melting building during charging and tapping. The three EAFs each have a capture system connected to the lid of the EAF which pulls negative pressure and sends to the baghouse. This capture system is known as a side draft hood. The EAFs also have a hood above the slag door, where slag is removed from the furnace. (Photos 6, 7) The side draft hood and the slag door hood both have a loose connection to the capture system when the EAF lid is closed.

During the charging and tapping of an EAF, the EAF lid is raised, and the capture system disconnects and no longer captures the particulate matter ("PM") emissions from the EAF. (AOC 1) Mrs. Jacobson told me that an automatic damper system stops the flow to the side draft hood when the lid is raised during

charging and tapping. Later that afternoon, Mrs. Jacobson told me that the damper on the fume collection system closes when the furnaces are off and when the furnace is tilted to a certain angle during tapping. She said that the side draft hood is disconnected during charging and tapping of the EAF, and that the side draft hood is connected during the melting, lancing, slag removal, and refining stages of the melt cycle.

The inspection team observed the baghouse for the EAFs. (Photo 8) The manual manometer for the EAF baghouse indicated a pressure drop of 9.5 inches of water column. (" WC)

The inspection team looked at a small diesel tank next to the EAF baghouse. (Photo 9) Mr. Jonas informed us that the facility used to have a 300-gallon gasoline tank which was represented in the facility's Title V permit expiring September 8, 2024 as Emission Point 41, and was subject to 40 CFR 63 Subpart CCCCCC. The gasoline tank was removed in 2021, though it was still included in the facility's 2021 emissions inventory.

The inspection team observed a landfill on the facility property near the EAF baghouse. Mrs. Jacobson informed us that the landfill was being closed in a few months and would be redesignated as a beneficial reuse area.

Molding Area

The inspection team toured the molding area, which has a similar process to the Amsted Rail facility in Kansas City. The ladle containing molten steel is covered and pressurized, and the steel is forced up into the graphite mold. The graphite mold consists of two parts: the cope, the top part of the mold, and the drag, the bottom part of the mold. The mold is sprayed with fused silica (fine sand and water) before the molten steel is added. The cope section of the mold also contains columns called "risers" which allow the steel to overfill up the riser, then settle back down leaving a stub on the wheel which is cut off. Sand mixed with resin is baked into the risers to form "cores", which decreases the diameter of the risers and the resulting stubs.

We toured the different process elements of the molding and finishing areas, including the mold filling, cope and drag separation, riser knockout, hot wheel grinder, hub cutter, wheel peening, apex grinder, and cope and drag spray booths. (Photos 11-14) We observed the baghouses and baghouse pressure monitors for the hot wheel grinder and hub cutter. We also observed the baghouse and baghouse pressure monitor for the apex grinder, wheel cleaner, wheel peener, and chamfer grinder. The various baghouse pressure differentials noted at the time of the inspection are listed in Table 1.

We toured the sand plant, where resin flakes are added to create a batch of coated sand. (Photo 10) The facility also adds a small amount of red iron oxide to the batch for quality purposes. We observed the baghouse for the sand plant, which captures emissions from the sand mixer, and the baghouse for the core baker bins and core baker revolver. (Table 1)

We looked at the baghouses for the drag cleaner and the cope cleaner. At 11:07 am, the pressure monitor for the drag cleaner (EP-11) was "pegged", meaning that the pressure exceeded the maximum for the monitor of 10" WC. (Photo 18) (AOC 3) Later that afternoon, Mrs. Jacobson told us that the

pressure differential for the drag cleaner baghouse had been 9.7" WC in the morning during its daily check, at some time before 8:30 am. She also told us that the facility's maintenance staff manually triggered a cleaning cycle for the drag cleaner baghouse after we had observed the pegged monitor, and after the cleaning cycle the drag cleaner baghouse pressure differential was 7" WC.

We observed a small Crystal Clean parts cleaner in the molding area. (Photo 15)

Table 1: Baghouse pressure differentials observed during inspection

Baghouse	Pressure differential
EAF Baghouse	9.5" WC
Hubcutter Baghouse	5.95" WC
Sand Mixer Baghouse	1.5" WC
Hot Wheel Grinder Baghouse	7" WC
Core Baker Bins and Core Baker Rollover Baghouse	2.9" WC
Wheel Cleaner and Peener Baghouse	6" WC
Grinding line, Chamfer, and Apex Grinder Baghouse	3" WC
Bollard CNC Lathe Baghouse	6.2" WC
Ingate Lathe Baghouse	13" WC
Drag Cleaner Baghouse	>10" WC (pegged)
Cope Cleaner Baghouse	6" WC

Mold Machining Shop and Emergency Generator

The facility makes 36 in., 42 in., and 43 in. wheels for locomotive and freight purposes. The facility has two lathes for maintaining wheel molds, a "Bollard" brand CNC controlled vertical lathe and a traditional ingate lathe. Each lathe has its own baghouse. We observed the pressure differential for both lathe's baghouse. (Table 1)

We observed the facility's emergency generator. The hour meter of the emergency generator was 44690 hours. The nameplate for the generator listed it as a 36 kW generator made in 2016. (Photo 19).

Records Review

We reviewed the facility's emergency generator maintenance plan as required by NSPS JJJJ.

Mr. Rodriguez reviewed the facility's records required by the facility's Title V permit Compliance Assurance Monitoring ("CAM") plans for 2018 through 2022. The facility has CAM plans in their Title V permit for the Electric Arc Furnaces; Hub Cutters; Apex Grinder, Wheel Grinder, Final Grinding, and Chamfer Grinder; Wheel Cleaner & Wheel Peener; Graphite Mold Machining; Hot Wheel Grinders.

Mr. Rodriguez identified the three deviations from the pressure ranges listed in the facility's CAM plans, which are listed in Table 2:

Table 2: Deviations from CAM plan pressure ranges

Date	Unit	Pressure Differential at baghouse (" WC)	CAM Plan acceptable pressure range ("WC)
2/5/2018	Electric Arc Furnace (EP-3)	12	5 - 11
11/14/2019	Hot Wheel Grinder (EP-20)	1.7	2 – 9
7/23/2021	Hub Cutter (EP-6)	9.5	2 – 9

Mr. Rodriguez noted that the daily pressure different logs, as required by the facility's CAM plans, do not include the time that the pressure reading was taken.

Mr. Rodriguez also reviewed the facility's records for the biweekly Method 9 opacity readings of the melt shop roof exhausts as required by Section III:EP-1 of the facility's Title V permit. Mr. Rodriguez noted that the opacity logs did not include the location from where the observer took the opacity readings. (AOC 4)

Electrical Arc Furnace Fugitive PM Emissions

The facility's three EAFs are subject to the NESHAP ZZZZZ total PM emission limit of 0.8 lbs of PM per ton of metal charged or 0.06 lbs of total metal HAP per ton of metal charged. These limits are located at 40 CFR 63.10895(c)(1) and incorporated into the facility's Title V operating permit in permit section III:EP-3. The total PM emission limit includes both emissions from the EAF baghouse and fugitive emissions from the EAF which are not captured and sent to the baghouse.

The facility is required to stack test the EAF baghouse emissions ever 2.5 or 5 years for PM, opacity, and HAP metals. I reviewed the most recent stack test from November 11, 2020, which had an average PM emission rate of 2.39 lbs per hour and 0.064 lbs of PM per ton of metal charged.

I reviewed the facility's emissions inventory for the EAF baghouse (EU-3A) and EAF fugitive (EU-3B) PM emissions for 2020 and 2021. The facility reported EAF baghouse emissions of 9.64 tons per year (TPY) of PM in 2020 and 11.14 TPY in 2021. For both 2020 and 2021, the facility used an emission factor of 0.09 lbs of PM per ton of metal charged, and the inventories noted that this emission factor comes from a stack test of the EAF baghouse on July 14, 2005. I recommended that the facility update this emission

factor using the more recent stack test on November 11, 2020. The facility also calculates their EAF baghouse metal HAP emissions from the PM emissions using an analysis of the baghouse dust in 2015.

The facility reported EAF fugitive PM emissions of 3.39 TPY in 2020 and 3.995 TPY in 2021. For both 2020 and 2021, the facility used an emission factor of 0.65 lbs of fugitive PM emissions per ton of metal charged. The total PM emissions reported by the facility were 49.7 TPY for 2020 and 51.8 TPY for 2021.

I also reviewed the facility's 2021 HAP metal annual report to Iowa DNR, as required by Section III:EP-1 of the facility's Title V permit. The facility estimates the fugitive metal HAP emissions from the EAF by multiplying the fugitive PM emissions by a metal HAP composition based off an analysis of baghouse dust on November 11, 2020. This report used an emission factor of 0.17 lbs of fugitive PM per ton of metal charged to calculate the EAF fugitive PM emissions.

The emission factors used for the facility's fugitive PM emissions rely on the EAF capture efficiency. The EAF capture efficiency used by the facility is 95%. I asked Mrs. Jacobson how this capture efficiency was determined. Mrs. Jacobson said that the capture efficiency comes from the 1981 EPA document "Summary of Factors Affecting Compliance by Ferrous Foundries, Volume 1-Text Final Report". Table 5-1 of the 1981 document gives a range of emission capture efficiency from 90-100%, with a typical maximum of 99%.

The EAF capture efficiency, which is pivotal to calculating the EAF fugitive PM emissions, does not appear to be based on any test data. Furthermore, the use of the 90-100% range is inappropriate for calculating the total fugitive PM emissions, as the side draft hood does not capture any significant PM emissions during charging or tapping. (AOC 1)

Phenol Emissions

I reviewed the facility's emissions inventory for 2020 and 2021 and reviewed how the facility calculates their phenol emissions. The 2020 and 2021 emissions inventories attribute most of the phenol emissions to the sand mixer (EU-27, EP-15), and the rest of the phenol emissions to the core baking station (EU-18, EP-5). For the sand mixer phenol emissions, the facility reported 3.04 tons in 2020 and 3.71 tons in 2021. For the core baking phenol emissions, the facility reported 0.55 tons in 2020 and 0.55 tons in 2021.

The facility also calculates their monthly phenol emissions for compliance with section I of their Title V permit. Section III:EP-15 of the facility's Title V permit requires that the facility limit their HAP (Phenol) emissions to less than 1.76 lbs/hr and 7.71 tons per consecutive twelve-month period from the sand mixer unit (EU-27). The permit does not have a specific phenol limit for the core baking unit.

For compliance with section EP-15 of their Title V permit, the facility tracks the amount of batches of resin-coated sand they make to create the cores for the molds on a monthly basis. Each batch of sand contains 20 lbs of resin. The resin used is Plastiflake 1118, a phenolic plastic resin, which contains 7% phenol by weight. The facility multiplies the number of batches of sand by the amount of resin used and phenol composition of the resin to determine the amount of phenol by weight entering the process. The facility then calculates the phenol emissions by multiplying by 50% to estimate the amount of the phenol that volatilizes into the atmosphere.

The facility told me that they had tried using a resin with a lower phenol concentration known as Plastiflake LP, which contains 5% phenol, and also briefly another resin containing 3.5% phenol. They said these lower phenol resins caused the sand to become loose and break apart, causing quality control issues with the wheel manufacturing, so they switched back to the 7% phenol resin.

I asked Mrs. Jacobson the basis for using a 50% volatilization rate in their phenol emission calculations. She said that the Amsted Rail Keokuk facility, similar to the Amsted Rail Kansas City facility, uses a letter from the resin manufacturer from 1996 that said that about 50% of the phenol in the resin volatilizes. The facility or the vendor have never done testing of the resin coated sand in the facility's process to confirm that this 50% volatilization rate is accurate. (AOC 2)

Mrs. Jacobson said that the coated sand that falls off the rollover is not baked and is recycled by sending back to the sand mixer. Spent unbaked sand is used as daily cover for the facility's landfill. She said that baked sand is sent off as beneficial reuse, and that testing has been done on the baked sand to ensure it meets the beneficial reuse criteria.

Section III – AREAS OF CONCERN

EPA inspectors Bobbs and Rodriguez conducted a closing conference at Amsted Rail/Keokuk Site at 16:30 on May 11, 2022 for the inspection. During the closing conference, Inspector Bobbs reviewed the four Areas of Concern noted during the inspection.

AOC 1 – Improper capture efficiency used for calculating fugitive PM emissions from EAFs

As the side draft hoods for the EAFs do not capture PM emissions during charging and tapping of the furnaces, the 90-100% capture efficiency from table 5-1 of the 1981 EPA document "Summary of Factors Affecting Compliance by Ferrous Foundries, Volume 1-Text Final Report" is inappropriate to use for calculation of fugitive PM emissions from all EAF operations, including charging and tapping. This incorrect capture efficiency could mean that fugitive PM emissions from the EAFs are being underestimated and that the facility may not be in compliance the PM limit in NESHAP ZZZZZ and its Title V permit.

AOC 2 – Lack of test data for volatilization rate used for calculating phenol emissions from sand mixer and core baking

The 1996 letter from the resin manufacturer is not a proper basis for estimating the phenol volatilization rate from the resin-coated sand during the sand mixing, core baking, and post core-baking cope lines. Test data is needed to establish an accurate volatilization rate and properly calculate the phenol emissions from the facility.

AOC 3 – Pressure gauge pegged for drag cleaner baghouse

Good air pollution control practice is to have an appropriate pressure gauge for the baghouse and ensure that the automatic cleaning cycles are maintaining the pressure drop within the vendor

recommended range. This may also be documented in the facility maintained Operation & Maintenance Plan for the drag cleaner baghouse (EP-11), as required by the facility's Title V permit.

AOC 4 – Pressure deviations and time/location missing from CAM plan records.

The three noted pressure deviations from the pressure drop ranges in the CAM plans for the EAF Baghouse (EP-3), Hot Wheel Grinder Baghouse (EP-20), and Hubcutter Baghouse (EP-6) are noted in Table 2. Also, the times are missing from all the facility's daily baghouse pressure drop checks and locations are missing biweekly melt shop roof exhaust opacity checks. This is contrary to General Condition 10 of the facility's Title V permit, Recordkeeping Requirements for Compliance Monitoring, which says that the date, place, and time of sampling and measurements shall be maintained in the facility's compliance monitoring records.

Section IV – FOLLOW UP

No additional information was received by EPA after exiting the Facility on May 11, 2022.

Section V – LIST OF APPENDICES

Appendix 1 – Photo Log – 19 photos taken 5/11/22