REGION 5
CHICAGO, IL 60604

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Smith Foundry, Minneapolis, Minnesota

FROM: Jacob Herbers, Environmental Engineer
AECAB (MI/WI)

THRU: Sarah Marshall, Section Supervisor
AECAB (MI/WI)

TO: File

BASIC INFORMATION

Facility Name: Smith Foundry

Facility Location: 1855 E 28th St, Minneapolis, MN 55407

Dates of Inspection: December 12-13, 2023

EPA Inspector(s):
1. Jacob Herbers, Environmental Engineer
2. Sasha Letuchy, Environmental Engineer

Other Attendees:
1. Curt Stock, Minnesota Pollution Control Agency
2. Adolfo Quiroga, President, Smith Foundry
3. Brian David, Maintenance Manager, Smith Foundry
4. Larry Kramer, General Manager, Smith Foundry
5. Paul Tuzi, CEO, Zynik Capital
6. Ben Gliksman, Senior VP and General Counsel, Zynik Capital
7. E.J. Juers, Operations Manager, Alliance Technical Group

Contact Email Address: David_Brian@smithfoundry.com

Purpose of Inspection: Observe stack testing and investigate compliance with the Clean Air Act and the Minnesota State Implementation Plan.

Facility Type: Iron Foundry

Regulations Central to Inspection: National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries Area Sources (40 C.F.R. Part 63, Subpart ZZZZZ), NESHAP General Provisions (40 C.F.R. Part 63, Subpart A), and Minnesota Rules, 7011.0150 - Preventing Particulate Matter from Becoming Airborne.

Arrival Times: 08:00 CST
Departure Times: 15:30 CST

Inspection Type:
☒ Unannounced Inspection

OPENING CONFERENCE

☒ Presented Credentials
☒ Stated authority and purpose of inspection
☒ Did not provided Small Business Resource Information Sheet. Reason: already provided.
☒ Provided CBI warning to facility

The following information was obtained verbally from Brian David, Adolfo Quiroga, Larry Kramer, and E.J. Juers unless otherwise noted.

Company Ownership: Smith Foundry Co. was purchased by Zynik Capital in December 2022.

Process Description:
The facility produces grey and ductile iron castings.

Silica sand is mixed with bentonite and water to form a binding material in the sand muller. A separate facing sand muller prepares sand for use on the cope and drag molding line. The sand gets sent to any of four mold-making stations. In the shell core area, sand is injected in a pattern into a magazine box, then down the line, phenol powder is added to produce cores.

Raw "pig iron" is melted in a furnace which has capacity for eight tons of iron. The furnace cycle is usually 24 minutes. The furnace is equipped with a lid. Approximately one quarter of the furnace capacity is tapped into a transfer ladle. After tapping in complete, a lid is placed on top of the transfer ladle. Additives, including flux, silicon carbide, pet coke, and magnesium (for ductile iron only), are added at the furnace, at the transfer ladle (for ductile iron only), or in a tundish ladle. Slag is removed from the process both at the furnace and in the ladles. Molten metal is poured into pouring ladles near the pouring and cooling line.

Liquid metal is then poured into the molds and onto cores to form products. After cooling, the metal castings are dumped into the shakeout system, where vibrating ducts and a rotating barrel knock sand off of castings and polish them. A cut-off saw is used to remove any gates that remained attached to the castings during shakeout. Castings are then shot blasted once or twice using chilled iron shot. Imperfections caused by molding are cut off in the grinding area and reused in the furnace.

Five baghouses control emissions from the facility, as follows:

Baghouse Name	Baghouse Location	Emission Unit(s) Controlled
CE01	Roof	Facing Muller and Shakeout
CE02	Back wall	Cutoff Saws
CE03	Roof	Shakeout
CE04	Back wall	Grinding and Shot Blaster
CE05	Interior	Sand Muller

Emissions from the furnace and from the casting & pouring equipment are not controlled. The furnace area has fans in the roof that exhaust to a common duct at the roof. The casting & pouring equipment, which consists of three automatic lines and one manual cope and drag line, has various exhaust systems which exhaust at the roof.

Stack testing was conducted on the inlets and outlets of all five baghouses (excluding the inlet of CE02) using EPA Methods 1, 2, 3, 3A, 4, 5, and on the outlets using EPA Method 202. EPA Method 12 was also conducted on the outlet of the five baghouses. Visible emissions observations were taken on the exhaust points of all five baghouses using EPA Method 9. Three runs of testing were conducted for each test, and the testing took three consecutive days.

Staff Interview:
Holes in ducts were patched in the past few months, and tarps/covers were added to parts of the facility to help reduce uncaptured emissions.

Facility personnel have been monitoring and recording pressure drops at the baghouses.

The facility hired a 3rd party to change all of the bags on three of their five baghouses in the prior few weeks before the stack test. The facility did not have records of when the bags were changed previously. CE04 had a pressure drop below the acceptable range for two days after the bags were changed, because they had not been “seasoned” yet.

The facility hired a 3rd party to measure the concentrations of constituents of the facility’s input metal. Smith Foundry also takes daily samples of the metallurgy in the facility’s furnace, but stated that the equipment is not calibrated for lead. All recycled metal charged into the furnace is internal rejected parts and internal scrap.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA observed capture at the emission units routed to baghouses. During Run 1 of CE05 inlet and outlet PM testing on December 12, 2023 at the sand muller, EPA identified a tarp that had fallen off the capture hood, resulting in emissions escaping the capture system, and requested that the facility repair it. Within 10 minutes of identifying the issue, Brian David reported that the issue had been corrected. EPA did not identify any capture issues at the other controlled emissions units.

Manometers had readings within their acceptable ranges (see images 3, 5, 25, and 32).

EPA observed furnace operations indoors. Tapping duration was approximately three minutes and charging duration was less than one minute. Based on visual observations, tapping produced the largest plume of emissions, followed by charging, and then melting (see video 28). There was a gap between the top of the furnace and the lid which resulted in uncaptured emissions escaping the furnace during melting. Particulate matter and sparks were generated from the pouring of liquid metal at the pouring & cooling lines (see images 12 and 14 and video 13).

The furnace area exhaust duct on the roof had increased visible emissions while the furnace was being tapped (see videos 46 and 54). Visible emissions were also observed from the exhaust vent above the casting & pouring area.

Some of the shakeout ductwork had gaps (see images 10, 15, and 19). Some ducts on the building envelope were not sealed (see images 36, 38, 51, and 64).

Windows and doors were generally closed (see images 1, 6, 24, and 60). A few exceptions were noted (see images 8, 18, 37, 38, 61, 63, and 65).

The surfaces inside the facility were generally dusty as shown in many of the images and videos.

Photos and/or Videos: were taken during the inspection.

Field Measurements: were not taken during this inspection.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility.

Reviewed documents:

- Facility map with manometers highlighted

- Facility map identifying portions of the shake out that go to CE01 and CE03
- Diagram of tundish ladle used for ductile iron production
- Example semiannual and monthly preventative maintenance work orders
- Heat sheet for 12/12/2023
- Manometer reading logs
- Metal constituent sampling datasheets - company and third party

Compliance Assistance: EPA noted several items such as open doors, unsealed gaps, and fallen covers that could quickly be fixed to reduce emissions. Some of these were fixed while EPA was still onsite. EPA encouraged the facility to continue taking steps to reduce emissions.

Concerns: EPA expressed concerns about uncontrolled emissions escaping the facility and complaints from the surrounding Environmental Justice community.

DIGITAL SIGNATURES

Report Author: Herbers, Jacob Digitally signed by Herbers, Jacob Date: 2024.01.09 14:02:34 -06'00'

Section Supervisor: SARAH MARSHALL Digitally signed by SARAH MARSHALL Date: 2024.01.09 14:23:54 -06'00'

APPENDIX A: DIGITAL IMAGE AND VIDEO LOG

1. **Inspector Name:** Jacob Herbers	2. **Archival Record Location:** EPA Electronic Records

#	File Name	Date & Time (CST)	Description
1	IMG_0481.JPG	2023:12:12 09:22:43	"This Window is to remain closed until further notice"
2	IMG_0482.JPG	2023:12:12 09:22:53	Claimed as Confidential Business Information
3	IMG_0483.JPG	2023:12:12 09:23:56	Baghouse pressure drop log
4	IMG_0484.JPG	2023:12:12 09:25:58	Facility blueprint with manometer locations highlighted
5	IMG_0485.JPG	2023:12:12 09:26:27	Manometer #5 reading 2 in. H_2O
6	IMG_0486.JPG	2023:12:12 09:31:04	Pile of sand inside the building near the north side
7	IMG_0487.JPG	2023:12:12 09:32:05	Tarp partially blocking PM from leaving equipment area
8	IMG_0488.JPG	2023:12:12 09:34:08	Broken window partially covered with cardboard - south side of east end of building
9	IMG_0489.JPG	2023:12:12 09:37:18	Fixed hole on north end of shakeout duct
10	IMG_0490.JPG	2023:12:12 09:39:21	Shakeout ducts in front of garage door with bottom gap
11	IMG_0491.JPG	2023:12:12 09:43:13	Curving duct coming up from shakeout duct
12	IMG_0492.JPG	2023:12:12 09:44:08	Worker pouring molten metal from transfer ladle into pouring ladle
13	MVI_0493.MP4	2023:12:12 09:44	Worker pouring molten metal from transfer ladle into pouring ladle
14	IMG_0494.JPG	2023:12:12 09:47:08	Worker pouring molten metal into molds
15	IMG_0495.JPG	2023:12:12 09:47:59	Gap in shakeout ducts under bridge
16	IMG_0496.JPG	2023:12:12 09:50:45	Recipes, including silicon, copper, chrome, nickel, vaxon
17	IMG_0497.JPG	2023:12:12 09:51:57	Cover added over shakeout duct hole
18	IMG_0498.JPG	2023:12:12 09:52:42	Garage door open on south side of building
19	IMG_0499.JPG	2023:12:12 09:53:11	Gaps in shakeout duct panels
20	IMG_0500.JPG	2023:12:12 09:54:21	Rotating drum at end of shakeout
21	IMG_0501.JPG	2023:12:12 09:55:33	Inside of rotating drum at end of shakeout
22	IMG_0502.JPG	2023:12:12 09:55:59	Furnace area with gap between chamber and lid
23	MVI_0503.MP4	2023:12:12 09:56	Furnace operating with lid closed
24	IMG_0504.JPG	2023:12:12 09:58:20	Garage door labeled "No Open Door"
25	IMG_0505.JPG	2023:12:12 09:59:23	Manometer #4 reading 1.3 in. H_2O
26	IMG_0506.JPG	2023:12:12 10:01:02	Holes in interior wall above furnace
27	MVI_0507.MP4	2023:12:12 10:02	Open furnace
28	MVI_0508.MP4	2023:12:12 10:04	Furnace tapping into ladle
29	IMG_0509.JPG	2023:12:12 10:10:50	Temporary stack on baghouse 2
30	MVI_0510.MP4	2023:12:12 10:29	Furnace slagging, additions, and tapping
31	MVI_0511.MP4	2023:12:12 10:33	Furnace charging
32	IMG_0512.JPG	2023:12:12 10:37:54	Manometer #1 reading 4.4 in. H_2O
33	IMG_0513.JPG	2023:12:12 10:38:26	Ventilation fan near CE01 with fallen cardboard partially blocking flow

34	IMG_0514.JPG	2023:12:12 10:41:16	Piles of dust on process equipment upstairs
35	IMG_0515.JPG	2023:12:12 10:45:07	Claimed as Confidential Business Information
36	IMG_0516.JPG	2023:12:12 11:15:26	Unsealed duct exiting north side of building above windows
37	IMG_0517.JPG	2023:12:12 11:21:11	Garage door on back of building with bottom gap and noticeable odor
38	IMG_0518.JPG	2023:12:12 12:26:07	Gap in shutters on northeast part of roof
39	IMG_0519.JPG	2023:12:12 12:27:02	CE01 stack test configuration
40	IMG_0520.JPG	2023:12:12 12:28:27	Side of Baghouse #1 with duct tape
41	IMG_0521.JPG	2023:12:12 12:33:05	Accidental Photo
42	IMG_0522.JPG	2023:12:12 12:33:14	View of central exhaust fan from roof with interior processes visible
43	IMG_0523.JPG	2023:12:12 12:33:37	View of central exhaust fan from roof with interior processes visible
44	IMG_0524.JPG	2023:12:12 12:34:16	CE05 stack test configuration
45	IMG_0525.JPG	2023:12:12 12:35:47	CE01 inlet stack test configuration
46	MVI_0526.MP4	2023:12:12 12:37	Visible emissions from furnace area exhaust duct, with steam in background
47	IMG_0527.JPG	2023:12:12 12:38:09	Furnace area exhaust point on roof
48	IMG_0528.JPG	2023:12:12 12:44:34	Accidental Photo
49	IMG_0529.JPG	2023:12:12 13:40:33	CE01 inlet duct held together with tape
50	IMG_0530.JPG	2023:12:12 14:18:59	CE01 inlet duct stack test configuration
51	IMG_0531.JPG	2023:12:12 14:26:49	Unsealed duct and missing flap on openings in wall atop roof near CE05
52	IMG_0532.JPG	2023:12:12 15:20:03	CE05 stack test configuration
53	IMG_0533.JPG	2023:12:13 09:23:35	CE03 exhaust stack test configuration
54	MVI_0534.MP4	2023:12:13 09:50	Visible emissions from furnace area exhaust duct
55	IMG_0535.JPG	2023:12:13 10:45:59	Flexible cover on hole on north end of shakeout duct
56	IMG_0536.JPG	2023:12:13 10:46:43	Flexible cover on hole on shakeout duct near bridge
57	IMG_0537.JPG	2023:12:13 10:47:15	Chute going into north end of shakeout duct
58	IMG_0538.JPG	2023:12:13 10:48:04	Pouring area exhaust ducts to roof
59	IMG_0539.JPG	2023:12:13 10:48:53	Ceiling ducts connected to pouring area
60	IMG_0540.JPG	2023:12:13 10:50:03	Sand piles and closed windows north side
61	MVI_0541.MP4	2023:12:13 13:33	Flapping open door to room on roof, machine sounds coming from inside
62	IMG_0542.JPG	2023:12:13 13:54:07	CE03 stack test configuration
63	IMG_0543.JPG	2023:12:13 13:59:07	Plywood door flapping open on roof near CE05
64	IMG_0544.JPG	2023:12:13 14:01:13	Open pipe on roof near CE05
65	IMG_0545.JPG	2023:12:13 14:21:06	Back garage door cracked open