UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

DATE: DEC 2 0 2019

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Waupaca Foundry, Inc. (Waupaca) - Plant 1, Waupaca, Wisconsin

FROM: Linda Rosen, Environmental Engineer
AECAB (IL/IN)

THRU: Nathan Frank, Section Chief
AECAB (IL/IN)

TO: File

BASIC INFORMATION

Facility Name: Waupaca Foundry, Inc. (Waupaca) - Plant 1

Facility Location: 406 North Division Street, Waupaca, Wisconsin

Date of Inspection: 11/4/2019-11/5/2019

EPA Inspector(s):
1. Linda Rosen, Environmental Engineer
2. Sarah Clark, Environmental Engineer

Other Attendees
1. Brian Tesch, Plant Manager, Waupaca Plant 1
2. Craig LeNoble, Environmental Engineer, Waupaca Plant 1
3. Bryant Esch, Environmental Coordinator, Waupaca Corporate
4. Todd Gunderson, Environmental Manager, Waupaca Plant 1
5. Brian Sands, Maintenance Manager, Waupaca Plant 1
6. Steve Heger, Melt Manager, Waupaca Plant 1
7. Christopher Krisel, Scrubber area, Waupaca Plant 1

Contact Email Address: brian.tesch@waupacafoundry.com; Craig.lenoble@waupacafoundry.com; bryant.esch@waupacafoundry.com

Purpose of Inspection: Inspect Waupaca Plant 1 in relation to Clean Air Act requirements.

Facility Type: gray iron casting manufacturer

Arrival Time: 2:05 p.m. on 11/4/19 and 8:15 a.m. on 11/5/19
Departure Time: 4:08 p.m. on 11/4/19 and 11:50 a.m. on 11/5/19

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

OPENING CONFERENCE

☒ Credentials Presented
☒ CBI warning to facility provided

The following information was obtained verbally from Waupaca Foundry representatives unless otherwise noted.

Company Ownership: Since 2014, Waupaca has been owned by Hitachi Metals. Prior to that, Waupaca was owned by KPS, a private equity group.

Process Description:
The facility takes in scrap iron, pig iron and recycled steel and produces raw castings such as disc brakes, agriculture and construction products and gear box housings castings. The castings are machined at one of Waupaca's machine shops or at the customers' facilities. There are over 3,000 different product numbers for castings, different in geometry and/or chemistry.

Scrap Management

Waupaca has material specifications for all its vendors. Waupaca's quality group goes out to the various vendors and certifies them. The charge yard attendant also does inspections of the incoming material to make sure that materials meet criteria. The weigh scale has a radiation detection device by the weigh scale. Materials that do not meet specifications are rejected.

Melting

The material is weighed in the charge bucket and charged to the one cupola furnace, installed in 2007 that has coke on the bottom. The coke is fuel that raises the melt temperature up to 3000 °F, melts the iron, and adds carbon to the casting. Air enriched with oxygen at 1000 °F is injected through tuyeres to intensify the melt. After melting, the material flows down the runner system to two 40-ton holding furnaces. The holding furnaces are uncontrolled. The material is about 2850°F leaving the cupola and about 2600°F down the runner system. The transfer ladle then transfers the iron to the molding lines for pouring. About 65-70 tons of iron is poured per hour in Plant 1. During the two days that the cupola is not running, the trap doors on the bottom are opened and the remaining coke is dumped out. The cupola is relined with blast material (refractory) and the bottom is re-done with sand. The actual brick is replaced once or twice per year.

When the facility tests the iron coming out of the cupola to see if it meets specifications, the facility also tests the iron for lead and cadmium. They also rely on the radiation detection device to identify if there are incoming lead materials. The facility continuously operates an alkaline powder injection system which injects alkaline into the cupola exhaust stream at a rate of 180 lb/hour for control of cadmium and lead. The material injected is Bantox 115 for which they have a SDS. They take a sample of the dust monthly and perform Toxicity Characteristic Leaking Procedures (TCLP) at the stack. Once per shift and three times per day they inspect that the proper amount is being injected into the system. The injection system also controls SO_2 emissions.

The gas from the cupola goes to a coarse grain separator, an afterburner (which Waupaca refers to as a combustion chamber) and then a recuperative hot blast tower which acts like a heat exchanger to heat the building and the air that goes back to the cupola. After the recuperative tower and before the baghouse is the alkaline injection system. The gases are controlled by a 10-module baghouse (ID C31) that exits stack S 31. The parameters monitored include afterburner minimum temperature and negative pressure on the cupola. There is also a baghouse leak detection system (BLDS) on the baghouse. The damper position on the cupola is automatically controlled but can be manually changed if needed.

The afterburner temperature is set to 1300 °F based on research the facility has done. Below that temperature, they cannot pull enough air. A temperature of 1850 °F is too hot for the baghouse.

<u>Coremaking</u>

Coremaking takes silt and sand and combines these materials with a resin binder. There are three types of coremaking processes: cold box, shell box, and warm box. Each of these types uses different resins. In cold box, sand is blown into the core with the resin binder and a catalyst. There are 7 cold box machines, but one is disconnected and will be replaced in February of 2020. In the shell box process, pre-coated sand is activated with heat. In the warm box process, gas burners heat the box itself instead of using a catalyst. There are 9 total warm boxes and 3 of these can also run shell. Two of the warm core boxes were recently installed.

The cold boxes are purged and the gases are controlled by a sulfuric acid (14 %) scrubber. The shell and warm box machines are not controlled by the scrubber. The pH, motor amperage and pressure drop are monitored at the scrubber. Flow rate is not monitored but they have established the relationship between amperage and flow rate. The facility stated that a capture assessment was conducted on the core machines. There is also a baghouse for the coremaking room. There is a hood and elephant trunk that take emissions to the baghouse from each of the six sand mullers.

The SDSs for the binders are stored electronically. The binder usage is tracked by spreadsheets and recorded as a percentage of the sand.

Molding

There are six molding lines that use a continuous vertical molding process. The sand mold uses clay to hold the sand together and the mold is pressed. Cores can be added at the molding machine for internal features. There are hoods over the molding lines that collect emissions to a baghouse. After iron is poured into the mold, the casting enters the cooling line and after about 160 feet, the casting is solidified.

Next is the millroom where cleaning, shotblasting, tumbleblasting and grinding (take off gating on casting) occurs. There are many baghouses in this area. In total, there are about 60 baghouses at the facility. Most exhaust outdoors except for a couple in the milling/finishing area (e.g., tumbleblast baghouse) that exhaust indoors.

Sand System

After casting there is a shakeout area to reclaim the sand. The sand is cooled using a fluid bed system using air and water. The sand is conveyed back to the sand mullers that mix the sand with clay and water. There is a silo above each of the six sand mullers. Shakeout is controlled by a baghouse and the air that is collected from the sand cooler goes to a baghouse. There is a BLDS on the stack of the sand side of the plant, not on each individual baghouse.

Staff Interview: The facility currently operates 4 days per week, 24 hours per day with a three-day break in pouring (Saturday, Sunday and Monday). If product demand is higher, the melting operations run 5 days per week and can operate 12 days straight if needed. The coring and finishing operations typically run one day longer than the melting operations. At the time of the inspection on 11/4/2019 only the core room and finishing operations were operating and pouring was not occurring. We were told that pouring would resume at about 10 p.m. on 11/4/2019. There are about 580 employees at Plant 1. Plants 2/3 have about 800 employees.

Regarding maintenance on the baghouses, the facility has a Maintenance Preventative Abatement Plan (MPAP). Multiple actions are done every shift such as checking photohelic gauges to see if they are plugged. Many actions are done for BLDS maintenance. The BLDS systems that are located in the stack are for regulatory purposes and the ones that are located directly on the baghouse are for internal purposes. They do monthly drift tests on the BLDS in the stack. This involves putting dust or blank cylinders into the probe and making adjustments. They do not change the sensitivity. On the cupola baghouse, they do leak detection on each module but not on any other baghouse. The BLDS gives pre-visible warnings prior to the alarms going off and the maintenance staff checks on them. The threshold for pre-visible warning and the alarms are determined during stack testing and approved by the State. According to Waupaca Foundry representatives, the alarm is allowed to sound up to 5 percent of their operation time, but Plant 1's alarms sound for approximately zero percent of operation time. Spikes are not monitored. The IT department calculates the alarm time for each stack as a percentage of time. The facility also checks the alarms to make sure they are working. The facility has an Operations and Maintenance (O & M) plan covering MACT compliance.

The facility stated that it recently received a construction permit for major changes to the facility's ventilation system to optimize air flow and reduce costs. They will be allocating their dust collectors to the best areas in the plant.

ETE does the facility's stack testing. The most recent test was a RATA test on the SO_2 Continuous Emissions Monitor System (CEMS) which is located on the cupola stack (S 31). MACT testing is done every 5 years. CO, VOC, and PM are tested on Stack 31.

The facility spends about 6 to 8 million dollars per year on capital projects. In the last 5 years, they installed a new cleaning machine in finishing. There are many equipment replacements. They claim the plant capacity has not really changed. The projects are mostly technology upgrades and/or efficiency projects.

TOUR INFORMATION

EPA toured the facility: Yes

Data Collected and Observations:
We toured the facility on 11/5/2019 while all processes were operational. We observed holding furnace 1 and observed the transfer ladle in front of the furnace (photo 1). We observed holding furnace 2 (photo 2) and pouring from furnace 1 (photo 3). The facility operates one holding furnace at a time. There's a heel in the furnace at all times. We observed the hooding over the transfer system (photos 4 and 5). We observed fumes from holding furnace 1 (photo 6). Video 7 shows gases not being captured at the ladle by furnace 1 (video 7). Video 8 shows gases not captured while pouring into the ladle. Photo 9 shows smoke rising up toward the ceiling.

We observed the melt control room and observed a schematic of the top of the cupola (photo 10). The afterburner temperature was 1432 °F and the baghouse inlet temperature was at 273 °F. The set point for the cupola pressure is -0.4 inches w.c. and the hourly average was -0.38 inches of w.c. We observed the top of the runner system (photo 11). The facility had lists of the various alarms at the facility (photos 12-15). They also had a list of shutoff conditions (photo 16). Photo 17 shows the runner with capture to the baghouse.

We observed the cold box machines. Photo 18 is the front of cold box 2. Photos 19-20 show the back of the exhaust duct and photo 21 is the back of cold box 2. The millers were above the cold boxes. The binder is a DMPA compound. There were bins for sand additives, two different types.

We observed the manual scrubber log, where entries are made once per shift of pressure drop, pump amperage, pH and water level (photo 22). A circular chart records the pH (photo 24) and the value can be read electronically (photo 23). The scrubber pressure drop was 1.9 inches w.c. (photos 25-26). Photos 27-28 show the overall scrubber. The scrubber pump pressure is monitored at the gauge and recorded manually once per shift (photos 29-30). Other readings at the scrubber included: scrubber fan amps: 43.11; scrubber recirculation pump amps: 18.04; pH meter 1: 0.1; pH meter 2: 0.02; tank level: 17.11. The pump amps are related to the flow rate. Usually the pH becomes an issue, triggering an action, before the amps do.

Photos 31-32 shows the warm box core machines. Sand blows into the box and instead of gas, they use burner heat to activate. There is no capture or control on the warm boxes. The shell boxes are heat activated also. Two of the core machines can be shell or warm.

We observed the molding operation. Compression is done at 2000 psi. The transfer ladle pours iron into the molds. We observed the cooling line on molding line 1 (photo 33). There are intakes in this area to the baghouse. There is no other emission control on the molding.

We observed the sand mixers and silos and the top of the cupola where the baghouse is located. The differential pressure was 0.3 inches of w.c. We took a photo of the duct from the baghouse to the stack. The BLDS is located in this duct (photo 34). There is another BLDS in the stack that we did not see. Photo 35 shows where they inject the dust for the BLDS tests. Sarah went to the top of the cupola where the pickup point to the baghouse is. Photo 36 is the combustion chamber. We also observed the coarse grain separator prior to the combustion chamber (Photos 37-38). Photos 39-42 show the connection between the cupola and the coarse grain separator. Photo 43 shows the connection between the coarse grain separator and the combustion chamber. Photo 44 shows the vertical exhaust from the combustion chamber. The cupola tower area was very dusty. The facility said that dust accumulation could be from maintenance and cleaning. Oil tubes are cleaned by blowing steel shot to top of tower that comes down and knocks the dust off.

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

Field Measurements: were not taken during this inspection.

RECORDS REVIEW

1. Plot Diagram: This was claimed as CBI.
2. MPAP and MACT O & M Plan
3. List of all Processes and Emission Controls
4. New Construction Permit

CLOSING CONFERENCE

The facility made CBI claims on the percentages of remelt, scrap and pig iron used (not discussed in this report); transfer ladle throughput (in the CBI section); the photos (on a CD); the plot diagram (in the CBI files); and details regarding two of the warm boxes (not discussed in this report).

SIGNATURES

Report Author: ______________________ Date: 12/20/19

Section Chief: ______________________ Date: 12/20/19

APPENDICES AND ATTACHMENTS

1. Media Appendix

Facility Name: Waupaca Foundry, Inc. (Waupaca) - Plant 1
Facility Location: 406 North Division Street, Waupaca, Wisconsin
Date of Inspection: 11/4/2019-11/5/2019

APPENDIX A: DIGITAL IMAGE LOG

1. **Inspector Name:** Linda Rosen or Sarah Clark	2. **Date(s) of Inspection:** 11/4/2019-11/5/2019
3. **Company/Facility Name:** Waupaca Foundry, Inc. (Waupaca) - Plant 1	4. **Street Address, City, State:** 406 North Division Street, Waupaca, Wisconsin
5. **Number of Images:** 42 **Number of Videos:** 2	6. **Archival Record Location:** "CBI: Waupaca Foundry Plant 1, Waupaca, WI Inspection Photos 11/4/2019-11/5/2019"

Image Number	File Name	Date and Time (CST)	Description of Image
1	PB050001.JPG	2019:11:05 09:32:31	Holding Furnace 1 with transfer ladle
2	PB050002.JPG	2019:11:05 09:33:26	Holding Furnace 2
3	PB050003.JPG	2019:11:05 09:33:52	Holding Furnace 1 pouring
4	PB050004.JPG	2019:11:05 09:35:33	Transfer system
5	PB050005.JPG	2019:11:05 09:37:25	Transfer system
6	PB050006.JPG	2019:11:05 9:37:41	Furnace 1 fumes
7	PB050007.MOV	11/5/2019 9:38	Video Furnace 1
8	PB050008.MOV	11/5/2019 9:40	Video of pouring from Furnace 1 into transfer ladle
9	PB050009.JPG	2019:11:05 09:40:54	smoke rising up to the ceiling furnace area
10	PB050010.JPG	2019:11:05 09:45:24	schematic of the top of the cupola
11	PB050011.JPG	2019:11:05 09:49:41	top of the runner system
12	PB050012.JPG	2019:11:05 09:56:28	Alarm Tables
13	PB050013.JPG	2019:11:05 09:56:38	Alarm Tables
14	PB050014.JPG	2019:11:05 09:56:46	Alarm Tables
15	PB050015.JPG	2019:11:05 09:56:55	Alarm Tables
16	PB050016.JPG	2019:11:05 09:58:00	Shutdown conditions
17	PB050017.JPG	2019:11:05 09:58:37	Runner with capture to baghouse
18	PB050018.JPG	2019:11:05 10:14:42	Cold box 2
19	PB050019.JPG	2019:11:05 10:15:14	back of the exhaust duct, cold box area
20	PB050020.JPG	2019:11:05 10:15:23	back of the exhaust duct, cold box area
21	PB050021.JPG	2019:11:05 10:15:35	Back of cold box 2
22	PB050022.JPG	2019:11:05 10:20:17	Scrubber log
23	PB050023.JPG	2019:11:05 10:22:27	Electronic readout of pH

Facility Name: Waupaca Foundry, Inc. (Waupaca) - Plant 1
Facility Location: 406 North Division Street, Waupaca, Wisconsin
Date of Inspection: 11/4/2019-11/5/2019

24	PB050024.JPG	2019:11:05 10:22:33	Circular chart of pH
25	PB050025.JPG	2019:11:05 10:25:29	Scrubber pressure drop gauge
26	PB050026.JPG	2019:11:05 10:25:44	Scrubber pressure drop gauge
27	PB050027.JPG	2019:11:05 10:30:01	Scrubber
28	PB050028.JPG	2019:11:05 10:30:04	Scrubber
29	PB050029.JPG	2019:11:05 10:32:51	Scrubber pump pressure gauge
30	PB050030.JPG	2019:11:05 10:33:05	Scrubber pump pressure gauge
31	PB050031.JPG	2019:11:05 10:38:24	Warm box
32	PB050032.JPG	2019:11:05 10:42:05	Warm box
33	PB050033.JPG	2019:11:05 10:48:18	Cooling line in molding
34	PB050034.JPG	2019:11:05 11:04:51	Duct from the baghouse to the stack
35	PB050035.JPG	2019:11:05 11:05:22	Location of injection for BLDS tests
36	PB050036.JPG	2019:11:05 11:11:42	Combustion chamber
37	PB050037.JPG	2019:11:05 11:12:47	Coarse grain separator
38	PB050038.JPG	2019:11:05 11:12:57	Coarse grain separator
39	PB050039.JPG	2019:11:05 11:13:45	Connection between the cupola and the coarse grain separator
40	PB050040.JPG	2019:11:05 11:13:59	Connection between the cupola and the coarse grain separator
41	PB050041.JPG	2019:11:05 11:14:14	Connection between the cupola and the coarse grain separator
42	PB050042.JPG	2019:11:05 11:14:22	Connection between the cupola and the coarse grain separator
43	PB050043.JPG	2019:11:05 11:14:38	Connection between the coarse grain separator and the combustion chamber
44	PB050044.JPG	2019:11:05 11:14:46	vertical exhaust from the combustion chamber