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

DATE: JUN 26 2019

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Gartland Foundry, Terre Haute, Indiana

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

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

TO: File

BASIC INFORMATION

Facility Name: Gartland Foundry

Facility Location: 330 Grant Street, Terre Haute, Indiana

Date of Inspection: 4/29/2019-4/30/2019

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

Other Attendees
1. Wyman Clark, Inspector, Indiana Department of Environmental Management (IDEM), on April 29
2. Tammy Haug, Inspector, IDEM, on April 30
3. Steve Cass, Chief Operating Officer, Gartland Foundry
4. Frank Elkins, Quality Manager/ISO Quality Rep, Gartland Foundry
5. Francis C. Porreca, Vice-President of Operations, Gartland Foundry
6. Dave Grimes, Vice-President of Finance, Gartland Foundry (April 30)
7. Kyle Emmen, 2nd Shift Supervisor, Garland Foundry (tour only)

Contact Email Address: Frank.Elkins@gartlandfoundry.com; and Fran.Porreca@gartlandfoundry.com

Purpose of Inspection: Inspect Gartland Foundry in relation to Clean Air Act requirements

Facility Type: a metal casting and foundry facility that produces gray and ductile iron castings

Arrival Time: April 29, 2019, 2:25 pm
Departure Time: April 29, 2019, 7:00 pm

Arrival Time: April 30, 2019, 1:10 pm
Departure Time: April 29, 2019, 2:20 pm

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

Opening Conference

☒ Credentials Presented
☒ CBI warning to facility provided

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

Process Description:
Gartland Foundry (Gartland) produces gray and ductile iron castings. The facility is a components producer with no machining done on parts that are sold. The facility has 40-50 customers and produces numerous products. Production is measured in net pounds of metal melted, pounds of castings produced, and pounds of castings shipped. The pounds of produced castings minus pounds of scrap yields the pounds of net castings shipped.

Pig iron (iron ore) is an incoming raw material. Basic pig iron is gray iron with different percentages of phosphorus, sulfur and manganese. Nodular or ductile pig iron is a higher quality, higher strength pig iron with 3.5-4 percent carbon and 2-3.5 percent silicon. The facility predominantly makes three to four grades of gray iron with different tensile strengths and four grades of ductile iron with three different chemistries (different tensile strengths, yield strengths and ductility) with the fourth grade being formed by off-site heat treatment. Iron comes in as an ingot brokered through a couple of different suppliers. Eighty to eighty-five percent of the pig iron comes from Brazil. Other raw materials in the process include: pure carbon (graphite); silicon (e.g., silicon carbide and ferrosilicon alloys); magnesium; steel (which is almost all iron with very low carbon content); and other additives such as nickel, copper, or tin which are used to refine grain structures, strength, etc.

<u>Melting</u>: The facility operates two furnaces, each with a melt capacity of four metric tons. The furnaces use coreless induction melting with induction coils. They are relined every third week. When the reline occurs, they start on a Friday and finish over the weekend. The furnaces operate two 10 hour shifts per day (5 AM – 3 PM and 3:30 PM – 1:30 AM) and are always operating. Metal is loaded by charge cars. They follow the recipe pertaining to the product being made, with ingredients weighed in the charge car. The furnaces are used interchangeably for both ductile and gray iron.

Both furnaces are controlled by one automatic pulse baghouse, #7 (BH 7). The baghouse operates at all times that the furnaces operate. They tap the furnace into the ladle. During pouring, they add inoculant (e.g., predominantly silicon) into the ladles. For ductile iron only, they add ferro magnesium. Inoculation is controlled by a hood over the place where the additions occur. The facility checks the chemistries from the ladle and then casts the molten metal into molds and cores.

Coremaking: Coremaking involves mixing and coating sand with a urethane binder and a gaseous catalyst in a cold box core machine. The mixture is blown into the core box and the catalyst is blown in. The facility now uses dimethyl isopropyl amine (DMIPA) as the catalyst but used to use triethylamine (TEA). They have three cold box core machines. They may install a fourth cold box machine as part of a larger expansion with a new core room. The gas emissions from the cold core box machines are controlled by an acid scrubber.

There are two shell core machines that use a heated core box. Silica sand is purchased pre-coated with a urethane binder. The heat starts the reaction. There are no air pollution controls on this process.

Mold Making: The facility makes molds by combining a premixed bentonite clay binder with water and sand in a mulling operation and then introducing it into molding machines (Sinto #1 and Sinto #2). Molds are the mirror reversal of cores; molds are "positive" or "near net shape" and cores are interiors and "negative." Cores go into molds. The melted iron is poured into the molds and cores. The Hosokowa BH 5 controls the mold making operation.

Pouring and Cooling: After the metal is melted, pouring occurs in a matter of seconds followed by 1.5 to 2 hours of cooling time. There is no dedicated baghouse control on the pouring operations, only the general shop floor dust collector.

Shakeout: After pouring and cooling, castings are separated from the molds and residual sand is removed and reclaimed in a process called "shakeout," wherein the molds are dumped on a vibratory conveyor. Reclaimed sand is recycled into the mold making process; molds consist of approximately 99% reclaimed sand whereas the coremaking process uses new sand exclusively. The shakeout process is connected to the Wheelabrator 88 BH 3.

Cleaning and Finishing: After shakeout, very small metal parts are transported to the back of the building to be cleaned and finished at a small rotary tumbler and spin blast unit that are connected to the Wheelabrator 35 BH 2. All other castings go to the Didion rotary tumbler where a media is used to knock off the sand. The Didion is connected to the Hosokawa BH 5. The castings are discharged by conveyor to the rotary turn table where the castings are removed from the gating system (if not previously removed by the Didion). Recently, ventilation was added to exhaust air from the rotary turn table to the Hosokawa BH 5. Next is the tumble blast, which is the last step of the cleaning process where the castings are hit with high velocity steel shot. The tumble blast is controlled by the Siemens BH 6. After the tumble blast, the castings are sent to one of two grinding operations: (1) four snag grinders which remove residual "gate" and "flash" and are controlled by BH 5 or (2) finish grinders which remove flash and are situated at eight downdraft tables. The finish grinding operation is controlled by baffles and the exhaust is general ventilation. There is no baghouse control.

There is a paint line for the 20-30 percent of castings that are painted.

Staff Interview: The facility operates Tuesday-Thursday, in four 10-hour shifts. The facility was not operating on April 29, the first day of the inspection. There are 102 total employees (88 hourly) throughout the company which consists of this one location.

We discussed the monitoring of parameters on the acid scrubber used to control gases at the core making machines. The facility representative was not sure of the details of the parameter monitoring but thought the following parameters were monitored: (1) pressure drop at the nozzle. With this pressure, flow rate could be calculated. The facility is considering installing gauges that can measure flow rate directly; (2) the pH of the water after scrubbing; there is a ceiling of 4.5 and if it gets to be about 4 or so, they add acid; and (3) the air pressure through the scrubber medium. As the medium is used up, the pressure increases until it requires a changeout of the medium. The facility was not sure what type of filter medium the scrubber has, only that it is not charcoal. The scrubber has not been tested recently.

We discussed the baghouses at the facility. For some baghouses, the facility representative was not sure which baghouses controlled which processes. For instance, on August 29, the facility representative was unclear as to what operations BH 3 controlled. On April 30, a facility representative explained that BH 3 was the Wheelbrator-88 baghouse which controls the casting shakeout. On April 30, the facility provided a list of the baghouses and the operations they controlled. The facility did not know if the baghouse pressure drop readings were tied to the programmable logic controller (PLC). They said that someone walks around and checks the pressure drops daily and August Mack does monthly checks. They did not know the required pressure range. There is no set frequency for changing the bags. An outside firm checks the bags with fluorescent powder and changes them as needed. Quarterly inspections are done on all baghouses by an outside contractor. A maintenance employee performs visible emissions readings daily on the roof and these are recorded on the daily preventative maintenance sheets. August MACT does monthly visible emission readings.

For the furnaces specifically, the facility claimed that the fans by the wall across from the furnaces achieve 65 percent capture of emissions from the furnace.

For the castings paint line, the facility did not know the VOC content of the one coating used or whether it contained hazardous air pollutants (HAPs).

Tour Information

EPA toured the facility: Yes

Data Collected and Observations:

On April 29, 2019, the facility was not operating. We started at the back of the building by the Spin Blaster (photo 1). We observed the small rotary Tumbler (photo 2) and the Tumbler and hood (photo 3). There were many sand fines on the floor. We observed the duct connection from the Tumbler to the baghouse (Photo 4) and the Spin Blaster Hopper (photo 5). We observed the pick-up points at the Spin Blaster that go to the BH (Photo 6). We observed the BH for the Spin Blaster and Tumbler (photo 7). We observed the ductwork for the Spin Blaster and the BH (photo 8).

Next, we visited the core room. The cores are made a week in advance. Photos 9 and 10 show the ductwork for the three cold box machines. Photo 11 is of the acid scrubber. We observed the differential pressure gauge and the nozzle pressure gauge. The pH was at 4.33, with the max being 4.5. Next, we observed the interior of cold box (CB-22) core machine (photo 12). We saw the sand hopper and where the gas catalyst is stored. We saw the horizontal urethane binder tanks. Photo 13 shows a core.

Next, we saw the induction melt furnaces. The ladle hangs from an overhead conveyor. The furnace hood moves when the furnace tilts to capture inoculation emissions. Room fans are located across from the furnace by the wall. From the platform, we observed the charge carts (which were described as a proprietary design). Here, the facility demonstrated how the charge carts and furnace hoods (when tilted) were also designed to fit one another, with the intended effect of limiting emissions from charging. We took several photos of the furnaces, fans and ductwork (photos 14-19).

We observed the mold making, pouring and cooling, shakeout, cleaning, and finishing processes while they were not running. The two mold making machines form the start of two production lines, which are identified as the Sinto #1 line and Sinto #2 line. Following each mold making machine is a long conveyor (where the pouring and cooling takes place) and lead to the two vibratory shakeout conveyors. We observed a hood directly over the casting dump on the Sinto 2 line; however, the same area on the Sinto 1 line had only an open duct (no hood) positioned several feet above the conveyor and a fan directed toward the area. The hood to the baghouse was high up on the tumble blast which the facility said was for clearance purposes. The facility said they are planning to get the hood closer to the operation. We took several photos here (photos 20-27).

We next observed the rotary turn table (photo 28). The facility stated that it had recently added ventilation to this operation to meet the OSHA silica standard. This operation has multiple pickup points around the interior circumference of the rotary turn table and is controlled by the Hosokawa BH 5. The facility has not conducted emissions testing on the Hosokawa BH 5 since installing these new vents.

We observed the four snag grinders.

We observed the paint room which was behind a sliding door. There is one customer and one paint used: a green one. The label said it was PPG #KWA1887 T2/275 GL, 0.9 VOC green air dry water based.

We returned to the furnace room where they were getting the furnaces ready to start up for Tuesday. BH 7 consists of two steps: a cyclone for heavy particles and then filters for small particles. Dust collects at the bottom.

April 30, 2019 site visit:

We returned to the facility on April 30, 2019 when it was operating. On April 29, 2019, we informed the facility that we might come back on April 30 but no definite commitment was made nor was a specific time set. We arrived at 1:20 p.m. Photo 29 shows the transfer of molten iron from the ladle to a pre-heated crucible, in preparation for mold making. Photo 30 shows the BH 7 magnehelic pressure gauge measuring 4 inches of water column.

The Spin Blaster and Tumbler were not operating but BH 2 was operating, measuring 2.4 inches of water column. Photo 31 shows part of the duct capped off for BH 2.

The core room had odors. The scrubber pH was 3.29 as the facility had added acid that morning. The liquid in the scrubber was 20-30 percent acid and about 70 percent water. The nozzle pressure was 28 psig. The differential pressure was 1.2 psig. We were informed that the scrubber media was plastic and is used to increase surface area. The facility representatives showed us the chart used to convert the measured nozzle pressure in psig to a flow rate in gallons per minute; they also informed us that they intended to install a flow meter that would directly measure the flow rate. We observed the facility employees sweeping sand near the core making cold boxes.

We observed Sinto #1 and Sinto #2 lines operating. Siemens BH 6 which controls the tumble blast was measuring 2.7- 2.8 inches of water column. The tumble blast had just emptied, so it was not currently running. Hosokawa BH 5 was operating at 4.4 inches of water column. It controls the sand muller, sand conveyor, Didion drum, and snag grinders.

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

Field Measurements: were not taken during this inspection.

RECORDS REVIEW

1. We received a list of emission units and their corresponding baghouses. The list was handwritten by Mr. Elkins.
2. We received a Safety Data Sheet for the paint used on the paint line.
3. Mr. Elkins showed us the first page of the August Mack report showing that they quarterly inspect the baghouse.

CLOSING CONFERENCE

We reviewed the photos with the facility. No CBI was claimed. We stated that we may send an email requesting additional documents or a Request for Information. We provided a small business fact sheet.

SIGNATURES

Report Author: ______________________ Date: 6/24/19

Section Chief: ______________________ Date: 6/26/19

APPENDICES AND ATTACHMENTS

1. Appendix A: Digital Image Log

APPENDIX A: DIGITAL IMAGE LOG

1. Inspector Name: Linda Rosen/Sarah Clark	**2. Date(s) of Inspection:** 4/29/2019-4/30/2019
3. Company/Facility Name: Gartland Foundry	**4. Street Address, City, State:** 330 Grant Street, Terre Haute, Indiana
5. Number of Images: 31	**6. Archival Record Location:** CD-R labelled: "Gartland Foundry, Terre Haute, Indiana Inspection Photos 4/29-30/2019"

Image Number	File Name	Date and Time (EDT)	Location	Description of Image
1	P4290011.JPG	2019:04:29 16:51:19	Not recorded	Spin blaster
2	P4290012.JPG	2019:04:29 16:52:27	Not recorded	Tumbler
3	P4290013.JPG	2019:04:29 16:53:31	Not recorded	Tumbler and hood; fines on floor
4	P4290014.JPG	2019:04:29 16:54:15	Not recorded	Duct connection for spin blaster
5	P4290015.JPG	2019:04:29 16:56:47	Not recorded	Shot hopper for spin blaster
6	P4290016.JPG	2019:04:29 17:00:11	Not recorded	Pick up points for spin blaster
7	P4290017.JPG	2019:04:29 17:02:02	Not recorded	BH 2, for spinblaster and tumbler
8	P4290018.JPG	2019:04:29 17:03:26	Not recorded	Ductwork for spin blaster and baghouse
9	P4290019.JPG	2019:04:29 17:09:46	Not recorded	Core room
10	P4290020.JPG	2019:04:29 17:10:03	Not recorded	Core room
11	P4290021.JPG	2019:04:29 17:10:19	Not recorded	Acid scrubber for 3 coremaking machines
12	P4290022.JPG	2019:04:29 17:14:14	Not recorded	CB-22
13	P4290023.JPG	2019:04:29 17:27:28	Not recorded	Core (example)
14	P4290024.JPG	2019:04:29 17:35:34	Not recorded	Furnace B
15	P4290025.JPG	2019:04:29 17:36:08	Not recorded	Furnace B
16	P4290026.JPG	2019:04:29 17:36:11	Not recorded	Furnace B ductwork

17	P4290027.JPG	2019:04:29 17:36:36	Not recorded	Furnace A, duct and fan by wall
18	P4290028.JPG	2019:04:29 17:40:03	Not recorded	Furnace B with ductwork
19	P4290029.JPG	2019:04:29 17:42:06	Not recorded	Furnace B charge configuration
20	P4290030.JPG	2019:04:29 17:55:53	Not recorded	Shakeout
21	P4290031.JPG	2019:04:29 17:58:47	Not recorded	Sinto 1 duct
22	P4290032.JPG	2019:04:29 17:58:54	Not recorded	Sinto 2 hood/shakeout
23	P4290033.JPG	2019:04:29 18:02:52	Not recorded	Didion
24	P4290034.JPG	2019:04:29 18:10:30	Not recorded	Ductwork for turn table (left), Didion (straight duct), and tumble blast (right)
25	P4290035.JPG	2019:04:29 18:10:44	Not recorded	Ductwork from photo 24 continuing outside
26	P4290036.JPG	2019:04:29 18:10:54	Not recorded	Ductwork from photo 24 continuing outside
27	P4290037.JPG	2019:04:29 18:14:18	Not recorded	Ductwork, pickup points at the rear of the tumble blast
28	P4290038.JPG	2019:04:29 18:18:56	Not recorded	Turn table
29	P4300097.JPG	2019:04:30 13:39:00	39.422222, -87.416667	Pouring iron from ladle into crucible
30	P4300098.JPG	2019:04:30 13:40:16	39.444138, -87.412822	BH 7 pressure gauge
31	P4300099.JPG	2019:04:30 13:43:59	39.443056, -87.411389	Capped off ductwork at BH 2 (spin blaster and tumbler)