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

DATE:

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
AK Steel Corporation, Middletown, Ohio

FROM: Gina Harrison, Environmental Scientist
AECAB (MN/OH)

THRU: Brian Dickens, Section Chief
AECAB (MN/OH)

TO: File

BASIC INFORMATION

Facility Name: AK Steel Corporation Middletown Works No. 2 Coke Plant

Facility Location: 1801 Crawford Street, Middletown, Ohio 45044

Date of Inspection: May 8, 2018

EPA Inspector(s):
1. Gina Harrison, Environmental Scientist
2. Marie St. Peter, Environmental Engineer
3. Patrick Miller, Environmental Engineer

Other Attendees
1. Scott Hamilton, Environmental Scientist, U.S. EPA Region 5 Air Monitoring and Analysis Section
2. Justin Coughlin, Environmental Scientist, U.S. EPA Region 5 Air Monitoring and Analysis Section
3. Dave Carney, Operations Manager, AK Steel No. 2 Coke Plant
4. Chris Potts, Environmental Manager, AK Steel No. 2 Coke Plant
5. Mike Bathe, Environmental Engineer, AK Steel No. 2 Coke Plant
6. Ron Toth, Supervisor, Fosbel (contractor to AK Steel No. 2 Coke Plant)
7. Ciara Oehring, Environmental Compliance Specialist, Southwest Ohio Air Quality Agency
8. Kerri Castlen, Environmental Compliance Supervisor, Southwest Ohio Air Quality Agency

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9. Mike Kramer, Environmental Compliance Supervisor, Southwest Ohio Air Quality Agency
10. Amy Koesterman, Environmental Compliance Specialist, Southwest Ohio Air Quality Agency

Purpose of Inspection: Coke plant inspection

Facility Type: Metallurgical coke plant

Arrival Time: 9:36 AM
Departure Time: 12:55 PM

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

OPENING CONFERENCE

☒ Credentials Presented
☒ CBI warning to facility provided

The following information was obtained verbally from Mr. Carney unless otherwise noted.

Process Description:
AK Steel Middletown Works Wilputte Battery manufactures metallurgical coke in one 76-oven four meters tall (in height) vertical flue byproduct coke oven battery and uses one refractory quench tower to quench coke after pushing. The battery and quench tower have been operating since the 1950s. Each of the 76 ovens has two accessible sides described in the permit as the coke side and the push side, for charging and pushing, respectively. Each side of the battery contains two doors per oven – a vertically-oriented, slot type oven door and a chuck door near the top of the oven door.

Production starts around 11am daily when the coke ovens are charged with a coal blend by extracting coal from the onsite coal bunker into a larry car by positioning the car over the empty oven, and discharging the coal, through a charging port on top of the battery, into the oven.

The coal is heated in the ovens to approximately 2,000 degrees Fahrenheit for a period of approximately 30 hours. The coking process generates coke oven gases, which are drawn away from the ovens to a collection main. The collection main, which serves the entire battery, directs the COG to the facility's coke by-product recovery plant where condensable materials (i.e., tars and light oils) are removed from the coke oven gas.

Once the coking process has completed, doors along the side of the ovens are opened, and the coke is pushed from the ovens into a railcar called a quench car. The quench car then transports the coke to a quench tower, where water is poured onto the coke in order to cool it. The

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quenched coke is then dumped onto a coke wharf to drain any excess quench water and to allow the coke to cool further.

A conveyor system then transports the cooled coke to a screening building. The screening building contains a single deck vibrating screen where furnace-sized coke is extracted and subsequently discharged through chutes to railcars. Coke breeze is removed through a discharge chute and transferred to a coke breeze bin. The coke breeze is removed from the bin and transported offsite by trucks.

The raw coke oven gas that enters the byproduct recovery plant is first sprayed with a flushing liquor to shock cool the inlet stream to about 175°F. The cooled coke oven gas is then directed to primary coolers to lower the temperature of the gas even further (to approximately 100°F). The flushing liquor and condensate generated by the cooling process drop down into a tar decanter. The tar removed from the decanter is collected and either sold to offsite customers or blended into the charging coal at the coal preparation area.

The cooled coke oven gas exits the primary coolers and is pulled by an exhauster operated at the byproduct plant through a series of separation units including: tar precipitators, an ammonia scrubber, a light oil scrubber, wash oil preheaters, and a light oil distillation process. The "cleaned" coke oven gas is then vented to a number of onsite and offsite combustion units as a fuel source. The coke oven gas is also recirculated along with blast furnace gas to provide heat to the coke oven battery.

Staff Interview: According to Mr. Carney, the coke ovens are original to the plant and haven't been substantially modified since they were built in the 1950s. The exhauster that pulls coke oven gas from the ovens to the byproduct plant for further processing is controlled both at the byproduct plant control room and by PLC to auto adjust damper settings that control the flow of coke oven gas to the byproduct plant. The quench tower baffles were replaced in December 2017 with dual layer, chevron design baffles to better control PM emissions. The plant was just beginning a ramp up to a daily 60-oven push schedule which will last through the summer.

In accordance with permit requirements, AK Steel personnel perform battery observations on a daily basis to identify potential fugitive emissions from the battery. When fugitive emissions, or leaks, are observed, AK Steel's contractor Fosbel applies silica-based luting materials to seal joints that appear to be leaking visible emissions. According to Mr. Carney and Mr. Toth, areas likely to leak include jointure between the goosenecks and the collection main, offtake lids, trunks, and gaskets, and oven doors. The silica welds typically hold for about 6 months, up to one year. The last few days of traverses and observations by AK Steel and Fosbel identified two leaking ovens, which were promptly added to Fosbel's daily repair schedule and repaired.

TOUR INFORMATION

EPA toured the facility: Yes

Data Collected and Observations:

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Two EPA inspectors traversed the battery beginning at 10:43 and ascended the battery at 11 AM. Inspectors observed 4 production cycles from start (flushing and charge) to finish (push and quench). The two inspectors descended the battery at 12:35.

During this period a third inspector observed charges and pushes at an area to the slight northwest of the battery using a digital opacity camera system (DOCS). Pictures and videos are saved to Sharepoint.

Inspectors noted visible emissions leaking from oven doors and components, as follows:

Time	Oven Number	Area of Oven Leaking
10:43 am	1	Push side, top of oven door
10:43 am	3	Push side, top of oven door and standpipe
10:44 am	5	Push side, top of oven door and standpipe
10:45 am	7	Push side, top of oven door
10:45 am	10	Push side, top of oven door and standpipe
10:45 am	11	Push side, top of oven door
10:45 am	16	Push side, top of oven door
10:46 am	19	Push side, top of oven door
10:46 am	22	Push side, top of oven door
10:46 am	24	Push side, top of oven door and standpipe
10:46 am	30	Push side, side of oven door
10:47 am	38	Push side, top of oven door and chuck door
10:47 am	40	Push side, top of oven door
10:47 am	42	Push side, top of oven door

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Inspectors ascended the battery between 11:00 and 11:18 am eastern and observed visible emissions leaking from the following ovens' offtake piping and oven components:

Time	Oven Number	Area of Oven Leaking
11:00 am	76	Coke side, offtake piping
11:00 am	74	Coke side, valve and offtake piping
11:01 am	70	Coke side, offtake piping
11:01 am	72	Coke side, offtake piping
11:02 am	69	Coke side, offtake piping
11:04 am	68	Coke side, offtake piping
11:04 am	64	Coke side, offtake piping
11:04 am	61	Coke side, offtake piping
11:05 am	60	Coke side, offtake piping
11:06 am	50	Coke side, offtake piping
11:06 am	48	Coke side, offtake piping
11:08 am	46	Coke side, offtake piping and gasket leading to collector main
11:09 am	42	Coke side, offtake piping
11:12 am	38	Coke side, offtake piping and gasket leading to collector main
11:12 am	34	Coke side, offtake piping
11:14 am	31	Coke side, offtake piping
11:14 am	27	Coke side, offtake piping
11:15 am	25	Coke side, offtake piping
11:17 am	24	Coke side, offtake piping

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11:18 am	18	Coke side, offtake piping
11:18 am	13	Coke side, offtake piping

Between 12:30 and 12:52 p.m., inspectors descended the coke battery and observed visible emissions leaking from the following ovens, offtake piping, and oven components:

Time	Oven Number	Area of Oven Leaking
12:30 pm	1	Push side, top of oven door and chuck door
12:30 pm	3	Push side, top of oven door
12:33 pm	5	Push side, top of oven door
12:34 pm	7	Push side, top of oven door and chuck door
12:36 pm	10	Push side, top of oven door and chuck door, and standpipe
12:36 pm	11	Push side, top of oven door and chuck door
12:36 pm	16	Push side, top of oven door
12:37 pm	19	Push side, top of oven door and chuck door
12:37 pm	22	Push side, top of oven door
12:37 pm	24	Push side, chuck door
12:38 pm	27	Push side, top of oven door
12:43 pm	40	Push side, top of oven door
12:43 pm	42	Push side, top of oven door
12:45 pm	48	Push side, top of oven door
12:47 pm	54	Push side, top of oven door and standpipe

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12:47 pm	58	Push side, top of oven door and standpipe
12:48 pm	63	Push side, top of oven door, gooseneck, and standpipe
12:48 pm	67	Push side, top of oven door and standpipe
12:49 pm	70	Coke side, top of door and standpipe
12:50 pm	72	Coke side, top of door and standpipe
12:50 pm	69	Coke side, top of door and standpipe
12:50 pm	68	Coke side, top of door and standpipe
12:52 pm	64	Coke side, top of door and standpipe
12:52 pm	71	Coke side, top of door and standpipe

Separately, two EPA Region 5 scientists performed Geospatial Monitoring of Air Pollution (GMAP), using a portable meteorological tower, a DUVAS analyzer, and Picarro cavity ringdown spectroscopy analyzer, to measure BTEX, SO2, and other VOC at fixed points near the battery. A final monitoring report is attached to this inspection report.

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

Field Measurements: were taken during this inspection.

CLOSING CONFERENCE

We thanked AK Steel personnel for their time and told that we would follow up with a copy of the inspection report when it was completed. We confirmed that nothing we had discussed was Confidential Business Information. We stated that we may issue a Section 114 Information Request or follow up with questions via phone or email.

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SIGNATURES

Report Author: _____ Date: _____

Section Chief: _____ Date: _____

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