DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
**ACTIVITY REPORT: Scheduled Inspection**

A864025343

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| **FACILITY:** SEVERSTAL DEARBORN, LLC | | **SRN / ID:** A8640 |
| **LOCATION:** 4001 MILLER ROAD, DEARBORN | | **DISTRICT:** Detroit |
| **CITY:** DEARBORN | | **COUNTY:** WAYNE |
| **CONTACT:** James E. Earl , Environmental Engineer | | **ACTIVITY DATE:** 06/03/2014 |
| **STAFF:** Katherine Koster | **COMPLIANCE STATUS:** Non Compliance | **SOURCE CLASS:** MEGASITE |
| **SUBJECT:** FY 2014 inspection - BOF | | |
| **RESOLVED COMPLAINTS:** | | |

Reason for Inspection: Targeted Inspection
Level of Inspection: PCE
Inspected by: Katie Koster, AQD
Personnel Present: Jim Earl, Environmental Manager; Bethany Gozdzialski, CEC, Inc.
Facility phone number: 313-845-3217
Facility fax number: 313-337-9395
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**FACILITY BACKGROUND**

Severstal Dearborn, LLC (SDL) is an integrated iron and steel mill which primarily produces flat rolled coils. Facility is operating at 4001 Miller Road, Dearborn. The previous address, 3001 Miller Road, has now been solely assigned to the Ford Motor Company Rouge Plant which is adjacent to the mill. The company was previously operating under the names Severstal Dearborn, Inc. and Severstal North America (SNA). SNA is now the corporate name of Severstal that encompasses all of its North American properties. Before being purchased by Severstal in 2004, the company was operating as Rouge Steel.

SDL is currently operating under ROP No. 199700004, and Permits to Install 182-05C, 8-08, and 8-08A. These permits have not been rolled into the ROP renewal. A public hearing was held July 2012. However, the ROP renewal is currently on hold pending the resolution of an EPA/AQD enforcement action. The facility was issued PTI 182-05C on May 12, 2014 to revise emissions limits that were exceeded based on stack testing that was required when 182-05B was issued and EPA required testing through an ICR related to the Integrated Iron and Steel MACT.

The facility is also operating under AQD Consent Order 6-2006.

**PROCESS DESCRIPTION**
**Below includes the processes discussed and/or observed during the inspection. This does not include the entire facility.**

The basic process in the BOP shop is as follows:

1. Molten iron/Hot Metal is received in torpedo cars from the C blast furnace. Hot metal is transferred (poured) from the torpedo car into a charging ladle at the hot metal transfer station. Charging ladles can be distinguished from tapping ladles by the pouring lip on them as well as the fact that they do not drain from the bottom. A moveable hood slides into place before pouring begins to collect and route emissions to the secondary baghouse (reverse air).
2. Once full, the charging ladle is moved by crane to the desulfurization station. A lance is lowered into position and powdered desulfurization agents (magnesium and lime) are blown through the lance using an inert carrier gas (such as nitrogen) and injected by fluid momentum into the hot metal bath. Materials are injected in amounts calculated to meet the desired sulfur content specification. This process liberates kish (carbon graphite). Kish is skimmed from the top of the ladle after desulfurizing is complete. Desulfurizing and slag skimming are controlled by a moveable hood and the desulfurization baghouse (shaker type).
3. Next, scrap is charged to one of two Basic Oxygen Vessels (A and B) and then the hot metal is poured into the furnace. The mixture in the vessel is about 70% scrap and 30% iron. One heat lasts about 40 minutes and produces approximately 250 tons of steel. Charging is primarily controlled by the secondary baghouse. There is also a charging hood.

4. Lime flux is added and oxygen blowing commences immediately thereafter. Oxygen blowing liberates carbon and creates the exothermic reaction needed to melt the scrap. Blowing takes approximately 18-22 minutes. Emissions are collected by the primary hood and controlled by the ESP.
5. After blowing, the furnace is tilted and tapped into a tapping ladle. Alloys are added during tapping and then aluminum and other materials, such as ferromanganese, are added to "kill" the reaction. Tapping is controlled by the secondary baghouse and there is a tapping hood.
6. Once the operator observes slag, the vessel is tilted the other way and turned upside down into a slag pot. This is controlled by the secondary baghouse.
7. The steel ladle is send to the Ladle Metallurgy Facility for further processing.

**INSPECTION NARRATIVE**

On 6/3/14, I arrived at the Severstal environmental offices around 9:30 a.m. and met with Mr. Jim Earl, Environmental Manager, and Bethany Gozdzialski, consultant from CEC. We proceeded to the plant. I observed the BOF roof monitor, secondary baghouse stack, and desulfurization baghouse stack while driving to the BOF parking lot. I did not observe any visible emissions.

I met with Mr. Joe Ryan, Steelmaking Manager, and the BOF manager. We discussed several items which are summarized below:

- The higher silicon content in the hot metal, the more scrap is needed
- Typical range of silicon in hot metal is 30 -120 (0.3 – 1.2%)
- Silicon, Phosphorus, and Manganese are the "fuels" in the hot metal that produce the exothermic reaction in the BOF vessel
- Amounts of silicon, phosphorus, sulfur, carbon, and manganese in the hot metal are the main constituents of concern
- Addition of scrap lowers temperature of hot metal which is desirable
- Starting and stopping the blow during a heat has potential to cause roof monitor emissions; even if the blow is restarted gradually and especially if the heat is in the "carbon burn" phase (8 to 14 minutes into the blow, most turbulent time)
- Vessel angle is trended in Wunderware
- Slag conditioner prevents unwanted constituents from re-entering the heat after steel is made and it can generate smoke seen at the roof monitor. Severstal in process of looking for another supplier than might reduce smoking.

Next, Jim, Bethany, and I walked through the process. We viewed the Hot Metal Transfer/Reladle station at the north end of the BOF building. Torpedo car 101 was being emptied into a ladle. The moveable hood was in place and a lot of fumes were being generated during pouring but I did not observe any fugitive emissions. When the ladle is half full, the hood is moved so that a sample of the hot metal can be collected to determine temperature and carbon content. It takes about 1.5 torpedo cars to fill one ladle.

We proceeded to the desulfurization process where sulfur is removed from the hot metal by injecting magnesium and lime via a nitrogen lance. This process is performed by contractors. A moveable hood slides into place to capture the emissions which are ducted to a shaker type baghouse. At 10:30 a.m., I recorded the following from the operations screen (values in () are values from prior inspection):
Heat # - 37764
Sulfur aim – 0.01
Fan amps – 91 (97)
Pressure drop – 4.9 (7.3) in. w.c.
Inlet T – 119.1F (136.6 F)
Opacity (6 min ave) – 9.3; based on the BLD readings as there is no COMS
Lime injection - 83 lbs/min
Mg injection – 29 lbs/min

The operator explained that lime helps magnesium flow so it doesn't burn up before it exits the lance. Magnesium hits the iron and burns which brings the sulfur to the surface of the hot metal. Also, when a heat with high titanium is received, they shoot for a lower end sulfur content than normal. They also have to pre-skim the top layer of the hot metal because titanium prohibits the lime and magnesium from penetrating the bath properly.

At 10:45 a.m., I walked outside of the pulpit to observe the capture of the desulfurization hood. There were some intermittent fugitive visible emissions at the front of the hood (charging aisle), about 10-15% opacity. I did not observe the slag skimming operation.

We proceeded to BOF vessel pulpits. Tapping of "A" vessel was in progress. The pipe that is connected to the tap hole has to be replaced about every 65 heats. Infrared cameras are used to determine when slag is entering the ladle and to stop tapping. Alloys are added during tapping when the ladle is about 1/3 full. Pour time was 7 minutes 30 seconds. Kicker is added at the end of the tap; it can smoke due to the aluminum "burning off" so the ladle needs to be left under the hood until the smoke ceases. From the tapping pulpit, the operator can see if the ladle is smoking and decide whether to move it from underneath the hood. I recorded a vessel angle of 86 degrees. Slag splashing extends the vessel refractory life significantly; Severstal pioneered this practice.

We proceeded to the other side of the pulpit where operators control the vessel during charging and O2 blowing. The operator manually turns a knob to open and close the dampers leading to the ESP or secondary baghouse based on the operation occurring. The damper positions are 1-4: 1- charge, 2-tap, 3-online, 4-ofline. There is also a screen the shows the % open of the damper.

Heat # 37764 was in progress; during the scrap and hot metal charge, the screen indicated that the damper was open 100%. Emissions appeared to be well captured by the hood during charging. Next, the vessel was turned upright and the operator changed the knob to damper position 3. At 11:13, O2 blowing started and the screen showed the damper to the ESP was open 100%. After the start of the oxygen blow, burnt lime is added to the vessel which helps with slag formation. Dolomitic lime is added as well. The dolomitic lime (MgO) coats the lining of the vessel to protect the refractory (this is the "basic" part of the process).
I recorded the following:
O2 flow rate – 22.6kscfm
Spray water nozzles 1-7 were open
Water flow rate was 538 gpm
Vessel position - 358
At 11:23 a.m., the operator reduced the blow rate to 17.16 kscfm as sparks were hitting the windows of the pulpit due to slopping from the vessel. Visible emissions readings were being taken by a Severstal contractor at the time which showed an opacity exceedance at the roof monitor. There are also cameras in the pulpit so the operators can see the exterior of the roof monitor. At 11:34 a.m., the operator switched to damper to tapping mode (knob turned to position 2). The screen showed that the tap damper was 99% open; the main exhaust damper was 21% open, and the north charge damper was 75%. All of this data is trended.

Typical operations are two heats per vessel before switching to the other one.

I inquired about any internal inspections of the ductwork from the vessels to the ESP, including the downcomer. I was told by Mr. Mark Smith, Maintenance Supervisor, that in April 2014, contractors went into the downcomer ductwork and removed some buildup although overall it was relatively clean. I requested a copy of the report which is on the attached CD.

We left the pulpit at 11:40 and returned to Mr. Earl's office.

**RULES/PERMIT CONDITIONS EVALUATED**

Permit to Install 182-05C was issued on May 12, 2014. Hourly and yearly limits have changed from PTI 182-05B based on numerous stack tests that have been conducted in the last several years and especially throughout 2013. Another round of testing is due within three years of permit issuance. At this time, the facility is in compliance with hourly limits in the permit that are based on stack testing as that is how the limits were derived.
I requested the following records which were provided on June 26, 2014:
1. Weekly exterior inspections of the guillotine damper, relief dampers, and downcomer and subsequent repair records for time period April, May, and June 2014. **IN COMPLIANCE. Weekly frequency appears to be met. See attached records and CD. (EUBOF, S.C. VI.22)**
2. Records of any internal inspections of the gas collection system ductwork from the vessels to the ESP, including the downcomer, for the last three years. **I received a report from an inspection conducted in April 2014 by a contractor which is on CD.**
3. For the Desulf and Secondary Baghouse: Compressed air, fan amps, and overall pressure drop on 6/3 from 12:10 a.m. to 11:59 p.m. (trending chart/graph). **IN COMPLIANCE. As the facility stated in their email response, compressed air pressure monitoring is not required because the baghouses are not pulse jet which is accurate. Pressure drop is being continuously monitored for both baghouses as shown in the graphs on the attached CD. The overall pressure drop for the secondary baghouse was between 0 and 9.5 in w.c. A review of the September 2013 O&M manual for the secondary baghouse indicates that**

**pressure drop should be below 10 (excerpt attached). Quarterly fan and interior inspections of both baghouses for 2014 were provided and appear to meet the required frequency. See attached CD. However, based on a review of the records, it appears that there are some improperly installed bags in the desulf baghouse that need attention. AQD will follow up with the facility. (FGBOFSHOP, S.C. VI.6a, g, and h., EUBOFDESULF, S.C. VI.3 a, g and h).**

4. Any BLD alarms and corrective actions taken for 2014. **Facility reported that no alarms have been experienced in the BOF.**

5. ESP COMS data for the last three months (6 minute and hourly averages). **UNABLE TO DETERMINE. There are some 6 minute averages above 20% although the frequency appears to be reduced from prior years. This is being addressed through the pending EPA/AQD consent decree. Facility has a process for reviewing these instances and determining the cause, including steam intereference. I have not requested that information at this time as it is not yet a part of an enforceable order. COMS data is on CD (G.C. 11).**

6. O2 blow rate and spray water flow rate for Heat #'s 37763, 37764 on 6/3 (trending chart is fine). **IN COMPLIANCE. There is no limit on the blow rate. However, blow rate should be reduced when slopping occurs. The blow rate graph show a reduction around 11:20 a.m. which correlates to the time AQD was in the BOF and witnessed the slopping event. See CD for graph. (FGBOPSHOP, S.C. VI.22).**

7. Weekly inspections of the capture system for the secondary baghouse and ESP for April, May and June 2014. **IN COMPLIANCE. Weekly inspection frequency appears to be met for the secondary baghouse (charge, tap, and hot metal hoods) and the ESP (boiler hood). See attached records and CD. However, based on a review of the records, it appears the HMT hood cable curtain was missing for several inspections. AQD will follow up with facility to confirm this has been replaced. (FGBOFSHOP, VI.3).**

8. 12 month rolling steel throughput for January – June 2014. **IN COMPLIANCE. Records were provided and are attached. 12 month rolling values are below the permit limit of 4,052,230 tons. (EUBOF, S.C. II.2).**

9. Monthly hot metal charge, steel tapped, and slag tapped for January – June 2014. **IN COMPLIANCE. Records were provided and are attached. (EUBOF, VI. 31)**

10. Daily steel production and daily iron processed for June 2014. **IN COMPLIANCE. Records were provided and are attached. Daily production is below the limits of 8,000 tons per day for iron and 12,200 tons per day for steel. (EUBOF, S.C. II.1)**

**SUMMARY**

AQD issued a violation notice on April 15, 2014 based on a review of last several Title V semi annual deviation reports which indicated on going issues with performance and documentation of inspections and maintenance, failure to follow the MACT continuous parametric monitoring plan for fan amps and damper positions, and excessive opacity deviations at the ESP stack. These items are currently unresolved. Also, at this time, there is a pending open enforcement action between DEQ/EPA/DOJ and Severstal. For these reasons, non compliance was chosen.

NAME Karl Kroda DATE 7/10/14 SUPERVISOR W. M.