CLEVELAND-CLIFFS INC.
Cleveland-Cliffs Steel Corporation
Dearborn Works
4001 Miller Road, Dearborn, MI 48120
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October 25, 2023

Ms. Katherine Koster
Senior Environmental Engineer
EQLE, AQD, Detroit District
3058 West Grand Boulevard, Suite 2-300
Detroit, Michigan 48202

Ms. Jenine Camilleri
Enforcement Unit Supervisor
EQLE, AQD
P.O. Box 30260
Lansing, Michigan 48909-7760

Re: Cleveland-Cliffs Dearborn Works
Response to Violation Notice dated October 6, 2023

Dear Mss. Koster and Camilleri:

I am writing on behalf of Cleveland-Cliffs Dearborn Works in response to the Violation Notice dated October 6, 2023. The Violation Notice alleges that Cleveland-Cliffs exceeded its permit limit for Manganese for the FGBOFSHOP Secondary Baghouse and ESP stacks combined during stack testing conducted on August 1-2, 2023.

Cleveland-Cliffs provided EGLE with a detailed analysis of the test results in its Notification of Retest submitted on September 1, 2023 and included with this response as attachment 1. In short, the following inconsistencies and conclusions were noted:

- The test results for manganese were extremely inconsistent. This is in contrast to the test results for PM, PM2.5 / PM10, and lead which were consistent across the test runs.
- The overwhelming portion of the manganese was present within the post-filter (back half or condensable) part of the sampling train. This contrasts with the distribution of manganese in previous stack tests on the ESP.
- The test results are not indicative of any deficiency in the operation of the ESP because the ESP is incapable of controlling condensable particulate and hence condensable manganese. The results are either an extreme outlier or are influenced by some form of sample contamination that was outside the control of Cleveland-Cliffs.
- The possibility of sample contamination is also supported by the fact that the elevated condensable manganese was only present in two of the three runs and was not present in the concurrent testing of the secondary baghouse.

Cleveland-Cliffs conducted a re-test on the ESP and SEC Baghouse on September 19-20, 2023. The results of that testing were in compliance with all emission limits, including manganese. Notably, approximately 96% of the manganese emissions from the ESP during the retest were filterable. This is in line with previous historical data prior to the August 1-2, 2023 test. ESP operating conditions for the September 19-20 retest were nearly identical to the August 1-2 testing in that both tests were conducted with 30 ESP fields in service with all casing No. 2 and a compartment in both casings No. 1 and No. 3 out of service. ESP performance based on an examination of the PM test results was likewise very similar (PM grain loading was 0.0021 gr/dscf for the retest and 0.0024 gr/dscf for the August testing. PM pounds per hour was 7.9 lbs/hr for the retest and 8.8 lbs/hr for the August testing). Detailed preliminary results for the retest were provided to EGLE in the transmittal letter for the August 1-2, 2023 stack test report which is included with this response as attachment 2.

The following three tables illustrate the degree to which the results for the August 1-2, 2023 are an outlier for manganese. Table 1 provides a comparison of filterable, condensable, and total manganese results for all stack tests conducted since July of 2022. The first and third runs of the August 2023 stack test are clearly outliers for total and condensable manganese. This is not the case for filterable manganese where the results are consistent across the board.

Table 1: Distribution of Manganese within the Test Run Samples for Previous 5 Testing Events (Including the August 2023 testing event and the September 2023 retest)

Date	Run	Total Manganese (Lb/hr)	% Filterable Manganese	% Condensable Manganese	Filterable Manganese Lbs/hr	Condensable Manganese Lbs/hr
7/26/2022	1	0.055	80.4	19.6	0.044	0.011
7/27/2022	2	0.037	70.9	29.1	0.026	0.011
7/27/2022	3	0.053	92.2	7.8	0.049	0.004
12/20/2022	1	0.062	96.4	3.6	0.060	0.002
12/20/2022	2	0.038	93.7	6.3	0.036	0.002
12/21/2022	3	0.057	88.1	11.9	0.050	0.007
5/16/2023	1	0.039	97.2	2.8	0.037	0.001
5/16/2023	2	0.052	96.7	3.3	0.050	0.002
5/17/2023	3	0.057	92.0	8.0	0.053	0.005
8/1/2023	1	0.274	17.9	82.1	0.049	0.225
8/1/2023	2	0.045	92.4	7.6	0.042	0.003
8/2/2023	3	0.100	57.4	42.6	0.057	0.043
9/19/2023	1	0.069	94.1	5.9	0.065	0.004
9/19/2023	2	0.062	97.6	2.4	0.060	0.002
9/20/2023	3	0.053	95.0	5.0	0.050	0.003

The possibility of sample contamination for manganese is further supported by the overall consistency of the other measured constituents, namely Particulate Matter (PM), over the previous 5 ESP testing events. This is illustrated in Table 2. This data is further indicative that ESP performance during the test was not a contributor to elevated manganese levels as an ESP is only designed to remove filterable particulate matter, not condensable particulate matter.

Table 2: Particulate Matter Test Results for Previous 5 Testing Events (Including the August 2023 testing event and the September 2023 retest)

Test Date	Jul-22	Dec-22	May-23	Aug-23	Sep-23
ESP PM (Grains/DSCF)	0.0040	0.0036	0.0030	0.0024	0.0021
ESP PM (Lb/hr)	10.23	11.30	10.97	8.94	7.89
ESP PM_{10} / $PM_{2.5}$ (Lb/hr)	25.37	13.97	15.53	12.03	13.83
No. ESP Equivalent Fields in Service	30	32	30	30	30

Another indication pointing to possible sample contamination can be seen through an examination of the process data. When examining process data related to raw material inputs (mainly Hot Metal Manganese Composition), ESP dust manganese composition, and BOF/ESP operating parameters such as oxygen blow rate, ESP draft, and ESP COMS opacity, nothing is observed that would account for the extreme outlier that Run 1 of the August 1-2 testing event is for manganese emissions as it relates to absolute amount and distribution. This data is presented in Table 3.

Table 3: Process Data for Previous 5 Testing Events (Including the August 2023 testing event and the September 2023 retest)

Date	Run	Hot Metal Mn (%)	ESP Dust Analysis Mn (mg/kg)	ESP Draft (in. Water)	ESP Number of Equivalent Fields in Service	Average Oxygen Blow Rate (scf)	Average ESP COMS Opacity (%)	BOF Tons per Hour
7/26/2022	1	0.44	4600	2.79	30	21418	2.12	252.1
7/27/2022	2	0.48	5700	2.85	30	21229	2.23	321.6
7/27/2022	3	0.47	5100	2.82	30	21069	1.77	246.5
12/20/2022	1	0.46	4800	2.83	32	20653	2.99	352.1
12/20/2022	2	0.46	7000	2.78	32	21375	2.94	369.6
12/21/2022	3	0.46	4400	2.81	32	21449	3.01	336.3
5/16/2023	1	0.44	3400	2.79	30	21380	3.55	319.0
5/16/2023	2	0.44	3800	2.78	30	21103	3.41	344.8
5/17/2023	3	0.46	2700	2.81	30	21436	4.25	317.0
8/1/2023	1	0.42	7400	2.80	30	21156	3.11	305.6
8/1/2023	2	0.47	6200	2.81	30	20926	3.15	332.5
8/2/2023	3	0.48	5200	2.80	30	19888	3.27	283.6
9/19/2023	1	0.48	6300	2.71	30	20785	4.42	340.0
9/19/2023	2	0.46	4600	2.74	30	20742	4.72	373.4
9/20/2023	3	0.53	7100	2.74	30	20959	3.80	333.3

In conclusion, the elevated manganese test results for the August 1-2, 2023 test were primarily driven by two outliers, one extreme, where a far more significant portion of manganese than observed in previous stack tests was collected in the condensable portion of the sampling train. Cleveland-Cliffs believes that sample contamination is the most probably reason for these outlier results. This is supported by the consistency of the PM results and BOF/ESP operating parameters over the series of tests. Further support to this conclusion is provided by the results of the September 19-20, 2023 retest which were in line with what was observed in testing conducted prior to the August testing event.

Cleveland-Cliffs believes that sample contamination is the most probable explanation for the outlier manganese results. In order to provide an indication of whether sample contamination occurred, Cleveland-Cliffs will require the stack test company to collect a proof train recovery sample from each separate sampling train that is used for metals testing on the ESP. In the event of a similar outlier run, this will allow for the possibility of completely ruling out contamination from stack testing equipment.

Due to the fact that sample contamination was the most probable cause for the outlier manganese result, Cleveland-Cliffs asserts that the results of the test do not constitute noncompliance.

Specific Information requested by Violation Notice

The following is the specific information requested by the Violation Notice.

The dates the alleged violation occurred

The stack test was conducted on August 1-2, 2023. The report was submitted to EGLE on September 29, 2023.

An explanation of the causes and duration of the violation

As detailed above, Cleveland-Cliffs believes that sample contamination was the most likely cause for the elevated manganese results.

Whether the violation is ongoing

The alleged violation is not ongoing.

A summary of the actions that have been taken and are proposed to be taken to correct the violation and the dates by which these actions will take place

A retest was completed on September 19-20, 2023. The retest was conducted under nearly identical operating conditions as the August 1-2, 2023 test. Results from the retest were in compliance with all applicable permit limitations.

Steps being taken to prevent a reoccurrence

As detailed above, Cleveland-Cliffs believes that sample contamination was the most likely cause for the elevated manganese results. While Cleveland-Cliffs cannot ensure that sample contamination of some sort will not occur in the future, additional QA/QC steps have been implemented with the stack test company that will provide a definitive indication of whether sample contamination from stack testing equipment occurred. In any case, the uncertainty associated with Lead and Manganese emissions was clearly stated in the draft consent decree modification and provides the reason for the extensive amount of post-rebuild testing required for the ESP. The 11th WHERAS clause states the following:

> WHEREAS, regarding the Violation Notices concerning emissions above the Pb and Mn emission limits in the Permit, Defendant is uncertain as to the impact the completed ESP Project will have on the Facility's compliance with Pb and Mn emission limits and asserts that higher emission limits may be technically warranted and supported by air dispersion modeling for the Mn initial threshold screening level and if ambient air monitor concentrations for Pb and Mn are satisfied with an ample margin of safety. Plaintiffs, however, believe the completed ESP Project is likely to address those issues such that no additional injunctive relief is required to resolve the Pb and Mn Violation Notices issued by EGLE. To address the uncertainty, this Consent Decree Modification requires additional testing to assess performance of the ESP Project as it relates to the control of Pb and Mn emissions.

If you have any questions regarding the provided information or require additional information, please contact David Pate at 313-323-1261.

Sincerely,

James E. Earl
Area Manager Environmental
Cleveland-Cliffs Dearborn Works

Attachment 1: Notification of Paragraph 22.5(b) Retest for August 1-2, 2023 Test

Attachment 2: Paragraphs 22.2(b) and 22.5(b) Submittal of Test Results for August 1-2, 2023 ESP Testing

Attachment 1: Notification of Paragraph 22.5(b) Retest for August 1-2, 2023 Test

CLEVELAND-CLIFFS INC.
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September 1, 2023

Via E-Mail

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Subject: Cleveland-Cliffs Steel Corporation Dearborn Works – Civil Action No. 15-cv-11804
DJ # 90-5-2-1-10702
Notification of Paragraph 22.5(b) Retest for August 1-2, 2023 Test

Pursuant to Paragraph 22.5(b) of the draft Consent Decree Modification, Cleveland-Cliffs Steel Corporation conducted its second quarterly test of the ESP following the completion of the ESP project. The test was conducted on August 1-2. Cleveland-Cliffs has continued conducting the tests pursuant to the draft Consent Decree Modification even though it is not yet effective.

Preliminary results of the August 1-2 ESP stack test indicate the PM emission rate was 14% of the limit and the lowest tested value we have achieved over a 3-run average. However, the manganese emissions appear to be in excess of the emission limit. Manganese emissions from the ESP and SEC Baghouse combined were 0.15 Lb/hr versus a permit limit of 0.10 Lb/hr. This is largely attributed to the condensable fraction of Manganese which the ESP is incapable of controlling. When looking at just filterable Manganese for the ESP, results were consistent with previous tests and under the emission limit. The detailed preliminary results for PM, PM_{10}, $PM_{2.5}$, Lead (Pb), and Manganese (Mn) are presented below in Table 1.

Table 1: Preliminary Test Results – ESP and SEC Baghouse – August 1-2, 2023

	Run 1	Run 2	Run 3	Average	Emission Limit
ESP Pb (Lb/hr)	0.009	0.004	0.007	**0.007**	**N/A**
ESP Mn (Lb/hr)	0.274	0.045	0.100	**0.140**	**N/A**
SEC BH Pb (Lb/hr)	0.007	0.003	0.003	**0.004**	**N/A**
SEC BH Mn (Lb/hr)	0.011	0.010	0.012	**0.011**	**N/A**
ESP PM (Grains/DSCF)	0.0027	0.0021	0.0023	**0.002**	**0.0152**
ESP PM (Lb/hr)	10.15	7.88	8.80	**8.9**	**62.6**
ESP PM10 / PM 2.5 (Lb/hr)	13.14	11.29	11.66	**12.03**	**47.5 / 46.85**

Table 1: Preliminary Test Results – ESP and SEC Baghouse – August 1-2, 2023 (continued)

Total Pb (Lb/hr)	0.016	0.007	0.010	**0.011**	**0.067**
Total Mn (Lb/Hr)	0.285	0.055	0.112	**0.15**	**0.10**
Total Filterable Mn (Lb/hr)	0.060	0.052	0.069	**0.06**	**N/A**

The manganese results from this test represent an outlier in both magnitude and character of the manganese emissions when compared to previous testing. In reviewing the data from this test and from prior tests, Cleveland-Cliffs has concluded the following:

- The test results for manganese were extremely inconsistent. This is in stark contrast to the test results for PM, $PM_{2.5}$/PM_{10}, and lead which were consistent across the test runs.
- The overwhelming portion of the manganese was present within the post-filter (back half or condensable) part of the sampling train. This contrasts with the distribution of the manganese in previous stack tests on the ESP.
- The test results are not indicative of any deficiency in the operation of the ESP because it is incapable of controlling condensable fraction of manganese. The results are either an extreme outlier or are influenced by some form of sample contamination that was outside of the control of Cleveland-Cliffs.

Following is a more detailed discussion of these conclusions.

1. ***Inconsistency of Manganese Samples Compared to Particulate and Lead Test Results.***

The manganese results for this testing event were extremely inconsistent. This is best presented by examining the standard deviation of manganese over the 3 test runs of the August testing event against previous test events where the test was performed with a majority rebuilt ESP. Some level of variation can be expected due to the sheer number of variables associated with BOF steelmaking. However, in this case, the standard deviation of the 3 runs for the August testing event is between 9 and 13 times higher than the three previous test events. Put another way, the variation of manganese results for the August test events is an order of magnitude higher than the 3 previous testing events that were conducted with similar ESP operating configurations.

Table 2: Manganese Test Results for August Testing Event and 3 Previous Test Events

	July 26-27 2022	**December 20-21 2022**	**May 16-17 2023**	**August 1-2 2023**
	Manganese Emissions (Lbs/hr)			
Run 1	0.055	0.062	0.039	0.274
Run 2	0.037	0.038	0.052	0.045
Run 3	0.053	0.057	0.057	0.100
Standard Deviation	0.010	0.013	0.010	0.120

These inconsistent test results for manganese are in contrast to the test results for PM, $PM_{2.5}/PM_{10}$, and lead, as identified above in Table 1. The particulate factions and lead all showed consistent results in the August test. This is therefore an indication of an anomaly with the manganese data.

2. ***Distribution of Manganese Within the Condensable Faction.***

In addition to the extreme variability in the manganese results, another anomaly present was ***where*** the manganese was collected within the sampling train. In previous test events, the majority of the collected manganese was within the filterable portion of the sample train. In most cases, this has accounted for over 90% of the total amount of manganese collected. This trend was completely reversed in the case of Run 1 of the August test event with only 18% of the collected manganese being within the filterable fraction. The same anomaly was present to a lesser extent in Run 3 of the August testing. This data is set forth in Table 3.

Table 3: Distribution of Manganese within the Test Run Samples for August Testing Event and 3 Previous Test Events

Date	Run	Total Manganese (Lbs/hr)	%Filterable Manganese	% Condensable Manganese	Filterable Manganese Lbs/Hr	Condensable Manganese Lbs/hr
7/26/2022	1	0.055	80.4	19.6	0.044	0.011
7/27/2022	2	0.037	70.9	29.1	0.026	0.011
7/27/2022	3	0.053	92.2	7.8	0.049	0.004
12/20/2022	1	0.062	96.4	3.6	0.060	0.002
12/20/2022	2	0.038	93.7	6.3	0.036	0.002
12/21/2022	3	0.057	88.1	11.9	0.050	0.007
5/16/2023	1	0.039	97.2	2.8	0.037	0.001
5/16/2023	2	0.052	96.7	3.3	0.050	0.002
5/17/2023	3	0.057	92.0	8.0	0.053	0.005
8/1/2023	1	**0.274**	17.9	82.1	0.049	**0.225**
8/1/2023	2	0.045	92.4	7.6	0.042	0.003
8/2/2023	3	0.100	57.4	42.6	0.057	0.043

Table 3 clearly presents Runs 1 and 3 of the August test event as outliers, particularly in regards to the amount of manganese collected within the condensable portion of the sampling train. Indeed, the condensable manganese Lbs/hr in Run 1 of the August sample is two orders of magnitude greater than the majority of the test runs.

3. ***Potential Root Causes***

There are two possibilities that can account for the above-discussed anomalies. The first possibility is that something within the process was sufficiently different to alter the normal distribution of manganese. Cleveland-Cliffs examined process data related to raw material inputs (mainly Hot Metal Manganese Composition), ESP dust manganese composition, and BOF/ESP operating parameters such as oxygen blow rate, ESP draft, and ESP COMS opacity. The data is presented in Table 4.

Table 4: Process Data for August Testing Event and 3 Previous Test Events

Date	Run	Hot Metal Mn (%)	ESP Dust Analysis (mg/kg)	ESP Draft (in. Water)	ESP Number of Equivalent Fields in Service	Average Oxygen Blow Rate (scf)	Average ESP Opacity %	BOF Tons per Hour
7/26/2022	1	0.44	4600	2.79	30	21418	2.12	252.1
7/27/2022	2	0.48	5700	2.85	30	21229	2.23	321.6
7/27/2022	3	0.47	5100	2.82	30	21069	1.77	246.5
12/20/2022	1	0.46	4800	2.83	32	20653	2.99	352.1
12/20/2022	2	0.46	7000	2.78	32	21375	2.94	369.6
12/21/2022	3	0.46	4400	2.81	32	21449	3.01	336.3
5/16/2023	1	0.44	3400	2.79	30	21380	3.55	319.0
5/16/2023	2	0.44	3800	2.78	30	21103	3.41	344.8
5/17/2023	3	0.46	2700	2.81	30	21436	4.25	317.0
8/1/2023	1	0.42	7400	2.80	30	21156	3.11	305.6
8/1/2023	2	0.47	6200	2.81	30	20926	3.15	332.5
8/2/2023	3	0.48	5200	2.80	30	19888	3.27	283.6

Notable for Run 1 on August 1 is that the ESP Dust Analysis is the highest of the runs and the Hot Metal Manganese content is the lowest. This would seem to imply that the scrap might have contributed a higher proportion of manganese than for the other test runs. However, neither of these parameters fit the criteria for being an outlier of sufficient magnitude to account for the extreme outlier that Run 1 of the August 1 test is for manganese emissions as it relates to absolute amount and distribution.

The second possibility is that the sample was somehow contaminated by the equipment used by the stack testing company onsite or by the laboratory that performed the analysis. The stack testing company (RWDI) conducted several checks to try to determine if contamination occurred.

First, RWDI followed-up with the laboratory to double-check the numbers and to review all the QA/QC measures employed. The laboratory reported no issues.

Second, RWDI examined the possibility that potassium permanganate used in a previous Method 29 testing event at another facility might have contaminated the samples (note that potassium permanganate was not used during this testing event). The laboratory checked the metal scans for potassium and found no correlation between the high manganese and potassium levels.

Finally, RWDI checked the pH of their acid bath cleaning solution to verify that the acidity level was in the proper range. No issues were identified. It should be noted that EGLE and Cleveland-Cliffs personnel had the opportunity to observe RWDI's onsite sample recoveries. Nothing of concern was noted as the recoveries were conducted in a clean area free from contamination and in accordance with Method 29 procedures.

As an additional check, Cleveland-Cliffs had RWDI analyze the back half of the Method 5/202 condensable particulate matter sampling train (conducted simultaneously with the Method 29 metals testing but as a completely separate sample train) to see if any elevated levels of manganese could be detected from the impingers or from the CPM filter. Minimal manganese was detected in all of these

Method 5/202 back half condensable samples. Cleveland-Cliffs acknowledges that this analysis is not an approved method and that there are a number of unknowns (such as the efficiency of the CPM filter in collecting manganese that had passed through the primary filter). However, Cleveland-Cliffs believes that it could be evidence that the gaseous manganese measured did not come from the Dearborn Works operations.

Based on this analysis conducted by Cleveland-Cliffs, RWDI, and the laboratory, neither potential root cause could be completely rule out. Cleveland-Cliffs believes that sample contamination is the most probable explanation. This is supported by the observation that elevated condensable manganese was not present in the concurrent testing conducted on the secondary baghouse. It stands to reason that if the BOF process was the source of the elevated condensable manganese, elevated condensable manganese would have also been present in the secondary baghouse test runs 1 and 3. This was not the case. For testing on the ESP going forward, Cleveland-Cliffs will require RWDI to collect a proof train recovery sample from each separate sampling train that RWDI uses for manganese testing. In the event of a similar outlier run, this will allow for the possibility of completely ruling out contamination from stack testing equipment.

4. ***Manganese Test Results are not Indicative of ESP Performance Issues.***

Cleveland-Cliffs assessed the overall performance of the ESP during the August test and has concluded that there were no issues with the ESP that would have resulted in the elevated manganese. An ESP is designed to remove filterable particulate matter, not condensable particulate matter. Therefore, regardless of the condition of the ESP, manganese that is in a condensable state will not be removed. A number of parameters validate the fact that ESP performance during this test was not a contributor to the elevated manganese levels. The parameters presented in Table 5 are filterable PM results, opacity, lead, and filterable manganese. The data set demonstrates that opacity and filterable manganese are at a level that is comparable to previous testing events. Results for both filterable PM and lead were the best observed for a 3-run data set in comparison to the previous test events that were analyzed.

Table 5: ESP Performance for August Testing Event and 3 Previous Test Events

Date	Run	Filterable PM (Gr/DSCF)	Filterable PM (Lb/hr)	Lead (Lb/hr)	Filterable Mn (Lbs/hr)	Opacity %	ESP Number of Equivalent Fields in Service
7/26/2022	1	0.0031	9.10	0.012	0.044	2.12	30
7/27/2022	2	0.0037	5.30	0.010	0.026	2.23	30
7/27/2022	3	0.0052	16.30	0.010	0.049	1.77	30
12/20/2022	1	0.0043	15.20	0.009	0.060	2.99	32
12/20/2022	2	0.0025	7.20	0.013	0.036	2.94	32
12/21/2022	3	0.0039	11.50	0.011	0.050	3.01	32
5/16/2023	1	0.0031	11.60	0.011	0.037	3.55	30
5/16/2023	2	0.0025	9.10	0.018	0.050	3.41	30
5/17/2023	3	0.0033	12.20	0.013	0.053	4.25	30
8/1/2023	1	0.0027	10.15	0.009	0.049	3.11	30
8/1/2023	2	0.0021	7.88	0.004	0.042	3.15	30
8/2/2023	3	0.0023	8.80	0.007	0.057	3.27	30

The expected performance for the rebuilt ESP was 0.003 gr/dscf. As identified in the table, the ESP exceeded this level of performance with 30 equivalent fields in service during all runs of the August 2023 stack test. In short, ESP performance during this test was as good as can possibly be expected. There is no technical basis to conclude that additional fields in service would provide any capacity to capture condensable manganese.

5. ***Lead and Manganese Emission Uncertainty as Stated in the Draft Consent Decree Modification.***

The draft Consent Decree Modification identifies the primary reason for the extensive post-rebuild testing. The 11th WHEREAS clause provides the background:

> WHEREAS, regarding the Violation Notices concerning emissions above the Pb and Mn emission limits in the Permit, Defendant is uncertain as to the impact the completed ESP Project will have on the Facility's compliance with Pb and Mn emission limits and asserts that higher emission limits may be technically warranted and supported by air dispersion modeling for the Mn initial threshold screening level and if ambient air monitor concentrations for Pb and Mn are satisfied with an ample margin of safety. Plaintiffs, however, believe the completed ESP Project is likely to address those issues such that no additional injunctive relief is required to resolve the Pb and Mn Violation Notices issued by EGLE. To address the uncertainty, this Consent Decree Modification requires additional testing to assess performance of the ESP Project as it relates to the control of Pb and Mn emissions.

As previously stated, Cleveland-Cliffs could not rule out the possibility of either sample contamination or some combination of process variables that led to an extremely elevated level of condensable manganese in one of the runs and a somewhat lower, but still elevated in comparison to previously collected data, level of manganese in another run. The additional QA/QC step of requiring a proof blank for each sample train will assist in these type of determinations. It should not be completely unexpected that outlier results will be obtained from the increased level of data that is being collected.

6. ***Approach to September Re-Test.***

Due to this conclusion, Cleveland-Cliffs intends to conduct a re-test on September 19, 2023, under the same ESP operating conditions as were present for the August 1-2 test. Cleveland-Cliffs affirms that the test will be performed in accordance with the test protocol previously submitted on March 17, 2023, and included with this submittal as Attachment A. The testing will be performed with ESP Casing 2, ESP Compartment 1A, and ESP Compartment 3B out of service. The 30 equivalent fields in service will be fields 106-110, 301-305, 401-410, and 501-506. The layout of fields for this performance test is presented in Attachment B. To the extent minor changes to this test configuration are necessary at the time of the test due to unexpected fields out of service, Cleveland-Cliffs will communicate with the onsite EGLE observers and obtain their approval for such minor changes prior to commencement of the test.

7. ***Conclusion.***

Preliminary test results for the August 1-2, 2023, test indicated an exceedance of the manganese permit limit. The results were primarily driven by two outliers, one extreme, where a far more significant portion

of manganese than observed in previously stack tests was collected in the condensable portion of the sampling train. Cleveland-Cliffs could not find issues with the process and believes sample contamination as the most probable reason for these outlier results. Nonetheless, additional QA/QC steps have been added to be able to make this determination.

The ESP clearly functioned as designed during this test event and achieved or exceeded the level of control that could be expected for all non-condensable parameters that an ESP can be expected to control. Due to this, Cleveland-Cliffs is intends to conduct a retest of the ESP with the ESP operating in an identical configuration as it did for the August 2023 testing as laid out in Attachment B.

If you have any questions, please contact David Pate at 313-323-1261.

Sincerely,

James E. Earl
Area Manager Environmental

Attachments:

Attachment A: Test protocol for May 16-17, 2023 ESP and SEC Baghouse testing submitted on March 17, 2023

Attachment B: Layout of ESP Fields in service for August 1-2, 2023 performance test and for September 19-20 retest

Attachment 2: Paragraphs 22.2(b) and 22.5(b) Submittal of Test Results for August 1-2, 2023 ESP Testing

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environment, Great Lakes, and Energy, Air Quality Division upon request.

Source Name: Cleveland-Cliffs Steel Corporation Dearborn Works — County: Wayne

Source Address: 4001 Miller Road — City: Dearborn

AQD Source ID (SRN): A3640 — ROP No.: MI-ROP-A3640-2016a — ROP Section No.: 1

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From 8/01/2023 To 8/02/2023

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Quarter 3 (Q3) 2023 Source Testing Report: Basic Oxygen Furnace (EUBOF) and Basic Oxygen Shop Operations (FGBOFSHOP)

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Taylor Murphy	General Manager	(313)317-8955
Name of Responsible Official (print or type)	Title	Phone Number

Signature of Responsible Official — Date: 9/15/23

* Photocopy this form as needed.

EQP 5736 (Rev 04/30/2019)

CLEVELAND-CLIFFS INC.
Cleveland-Cliffs Steel Corporation
Dearborn Works
4001 Miller Road, Dearborn, MI 48120
P 313 317 8900 clevelandcliffs.com

September 29, 2023

Via E-Mail

EES Case Management Unit
Environment and Natural Resources Division
U.S. Department of Justice
Eescasemanagement.enrd@usdoj

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Air Enforcement and Compliance Assurance Branch
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R5airenforcement@epa.gov

Subject: Cleveland-Cliffs Steel Corporation Dearborn Works – Civil Action No. 15-cv-11804
DJ # 90-5-2-1-10702
Paragraphs 22.2(b) and 22.5(b) Submittal of Test Results for August 1-2, 2023 ESP Testing

In accordance with Paragraphs 22.2(b) and 22.5(b) of the current draft First Material Modification to the Consent Decree in the matter referenced above, Cleveland-Cliffs is providing this report documenting test results for the August 1-2, 2023 ESP and SEC Baghouse Stack Test. The testing was conducted by RWDI USA LLC (RWDI) in accordance with the test plan and notification submitted to EGLE on March 17, 2023 and to EGLE and USEPA on April 14, 2023. Testing was conducted on the ESP for Particulate Matter (PM), Particulate Matter less than 10 microns (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), Lead (Pb), Manganese (Mn), and Opacity (VE). In addition, testing was conducted on the SEC Baghouse for Pb and Mn. In addition, the test was conducted at the established ESP operating standard of 30 equivalent fields in accordance with Paragraph 22.2(a) of the current draft First Material Modification to the Consent Decree.

Results of the testing indicated a PM emission rate of 14% of the permitted emission limit, which is the lowest tested value we have achieved over a 3-run average since the commencement of the ESP Rebuild Project. PM_{10}, $PM_{2.5}$, lead, and opacity were also in compliance with the applicable emission limits. However, the manganese emissions appear to be in excess of the emission limit. Manganese emissions from the ESP and SEC Baghouse combined were 0.15 Lb/hr versus a permit limit of 0.10 Lb/hr. This is largely attributed to the condensable fraction of Manganese which the ESP is incapable of controlling. When looking at just filterable Manganese for the ESP, results were consistent with previous tests and under the emission limit.

The manganese results from this test represent an outlier in both magnitude and character of the manganese emissions when compared to previous testing. In reviewing the data from this test and from prior tests, Cleveland-Cliffs has concluded the following:

- The test results for manganese were extremely inconsistent. This is in stark contrast to the test results for PM, $PM_{2.5}/PM_{10}$, and lead which were consistent across the test runs.
- The overwhelming portion of the manganese was present within the post-filter (back half or condensable) part of the sampling train in only two of the three runs. This contrasts with the distribution of the manganese in previous stack tests on the ESP.
- The test results are not indicative of any deficiency in the operation of the ESP because it is incapable of controlling the condensable fraction of manganese. The results are either an extreme outlier or are influenced by some form of sample contamination that was outside the control of Cleveland-Cliffs. The possibility of sample contamination is also supported by the fact that the elevated condensable manganese was only present in two of the three runs and was not present in the concurrent testing of the secondary baghouse.

A detailed discussion is provided in Cleveland-Cliffs' Notification of Paragraph 22.5(b) Retest for August 1-2, 2023, attached here for reference and previously submitted to USEPA and EGLE on September 1, 2023. These conclusions are further supported by preliminary stack test results received for testing conducted on September 19-20, 2023. The results are presented below and were in compliance with all emission limits. Notably, approximately 96% of the Manganese emissions from the ESP were filterable. This is in line with previous historical data prior to the August 1-2, 2023 test. ESP operating conditions for the September 19-20 test were nearly identical to the August 1-2 test and ESP performance based on examination of the PM test results was likewise very similar (PM grain loading was 0.0021 gr/dscf compared to 0.0024 for the August testing and PM Lbs/hr was 7.9 Lbs/hr compared to 8.8 Lbs/hr for the August testing).

Table 1: Preliminary Test Results – ESP and SEC Baghouse – September 19-20, 2023

	Run 1	Run 2	Run 3	Average	Emission Limit
ESP Pb (Lb/hr)	0.0160	0.0160	0.0190	**0.0170**	
ESP Mn (Lb/hr)	0.069	0.062	0.053	**0.061**	
SEC BH Pb (Lb/hr)	0.003	0.003	0.004	**0.003**	
SEC BH Mn (Lb/hr)	0.008	0.007	0.011	**0.009**	
ESP PM (Grains/DSCF)	0.0021	0.0023	0.0017	**0.0021**	0.0152
ESP PM (Lb/hr)	8.1	8.9	6.7	**7.9**	62.6
ESP PM_{10} / $PM_{2.5}$ (Lb/hr)	13.58	15.82	12.10	**13.83**	47.5 / 46.85
Total Pb (Lb/hr)	0.0192	0.0194	0.0226	**0.0204**	0.067
Total Mn (Lb/Hr)	0.077	0.069	0.064	**0.0700**	0.10
Total ESP Filterable Mn (Lb/Hr)	0.065	0.060	0.050	**0.059**	N/A

The September 19-20, 2023 retest supports our assessment that the ESP continues to operate better than manufactures guarantee and that the August 2023 test results were an anomaly likely caused by outside contamination and not ESP performance.

If you have any questions, please contact David Pate at 313-323-1261.

Sincerely,

James L. Earl
Area Manager Environmental

Attachments:

Quarter 3 (Q3) 2023 Source Testing Report: Basic Oxygen Furnace (EUBOF) and Basic Oxygen Furnace Shop Operations (FGBOFSHOP) (Test conducted August 1-2, 2023)

Cleveland-Cliffs Notification of Paragraph 22.5(b) Retest for August 1-2, 2023 submitted to USEPA and EGLE on September 1, 2023

CC:

TPU Supervisor, EGLE Air Quality Division (hard copy)
EGLE Detroit District Office (hard copy)

CLEVELAND-CLIFFS INC.
Cleveland-Cliffs Steel Corporation
Dearborn Works
4001 Miller Road, Dearborn, MI 48120
P 313 317 8900 clevelandcliffs.com

October 20, 2023

Via E-Mail

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Air Enforcement and Compliance Assurance Branch
U.S. Environmental Protection Agency, Region 5
R5airenforcement@epa.gov

Subject: Cleveland-Cliffs Steel Corporation Dearborn Works – Civil Action No. 15-cv-11804
DJ # 90-5-2-1-10702
Paragraphs 22.2(b) and 22.5(b) Notification of Test

In accordance with Paragraphs 22.2(b) and 22.5(b) of the current draft First Material Modification to the Consent Decree, Cleveland-Cliffs is providing this notice of a performance test.

Performance testing on the ESP and Secondary Baghouse is scheduled to commence on November 21, 2023. Cleveland-Cliffs affirms that the testing will be performed in accordance with the test protocol previously submitted on March 17, 2023 with the exception of a minor change in methodology for measuring Oxygen and Carbon Dioxide content for the purpose of calculating molecular weight. The test plan submitted March 17, 2023 is included with this submittal as Attachment A. A description of the requested methodology change for Oxygen and Carbon Dioxide measurement is included with this submittal as Attachment B. The testing will be performed with ESP Casing 3, ESP Compartment 1A, and ESP Compartment 4B out of service. The 30 equivalent fields in service will be fields 106-110, 201-210, 401-405, and 501-506. The layout of fields for this performance test is presented in Attachment C. To the extent minor changes to this testing configuration are necessary at the time of the test due to unexpected fields out of service, Cleveland-Cliffs will communicate with the onsite EGLE observers and obtain their approval for such minor changes prior to commencement of the test.

If you have any questions, please contact David Pate at 313-323-1261.

Sincerely,

James E. Earl
Area Manager Environmental

Attachments:

Attachment A: Test protocol for May 16-17, 2023 ESP and SEC Baghouse testing submitted on March 17, 2023

Attachment B: Requested methodology change for Oxygen and Carbon Dioxide measurement

Attachment C: Layout of ESP Fields in service for November 21 testing

Attachment A

Test protocol for May 16-17, 2023 ESP and SEC Baghouse testing submitted on March 17, 2023

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environment, Great Lakes, and Energy, Air Quality Division upon request.

Source Name: Cleveland-Cliffs Steel Corporation Dearborn Works — County: Wayne

Source Address: 4001 Miller Road — City: Dearborn

AQD Source ID (SRN): A8640 — ROP No.: MI-ROP-A8640-2016a — ROP Section No.: 1

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

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☒ **Other Report Certification**

Reporting period (provide inclusive dates): From N/A To N/A

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Source Test Plan for 2023 Compliance Emissions Testing - Basic Oxygen Furnace (EUBOF)
and Basic Oxygen Furnace Shop Operations (FGBOFSHOP)

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete.

LaDale Combs	General Manager	(313)317-8955
Name of Responsible Official (print or type)	Title	Phone Number

LaDale Combs — 3.14.23

* Photocopy this form as needed.

EQP 5736 (Rev 04/30/2019)

CLEVELAND-CLIFFS INC.
Cleveland-Cliffs Steel Corporation
Dearborn Works
4001 Miller Road Dearborn MI 48120
P 313 317 8900 clevelandcliffs.com

March 16, 2023

TPU Supervisor
EGLE-AQD
Technical Programs Unit
Constitution Hall, 2nd Floor South
525 West Allegan Street
Lansing, MI 48933-1502

Subject: Cleveland-Cliffs Inc. Dearborn Works (CCDW), SRN A8640 – Test Protocol for BOF Electrostatic Precipitator (ESP) and Secondary Emission Capture (SEC) Baghouse

Reference: ROP MI-ROP-A8640-2016a
ESP Rebuild Project

Dear TPU Supervisor,

Enclosed is a hard copy of the referenced test protocol for the BOF ESP and SEC Baghouse. The testing is being conducted to evaluate compliance with the particulate matter (PM), particulate matter less than 10 micron (PM_{10}), and particulate matter less than 2.5 micron ($PM_{2.5}$) emission limits for the ESP and the lead (Pb) and manganese (Mn) emission limits for the ESP and SEC Baghouse combined after the completion of Phase V of the ESP rebuild project. In addition, opacity for the ESP will also be evaluated. Pb and Mn testing on the ESP and SEC Baghouse will take place simultaneously. It is expected that the new casing will be online and commissioned prior to the end of March. The testing is scheduled to take place from May 16-17, 2023.

If you have any questions, please contact David Pate at 313-323-1261.

Sincerely,

James E. Earl,
Area Manager Environmental

Enclosures: Site-Specific Test Plan – Electrostatic Precipitator and SEC Baghouse

cc: A. Wendling, EGLE (w/enclosures)

TEST PLAN

CLEVELAND-CLIFFS

DEARBORN, MICHIGAN

BASIC OXYGEN FURNACE (EUBOF) AND BASIC OXYGEN FURNACE SHOP OPERATIONS (FGBOFSHOP): TEST PLAN

RWDI #2303982

March 9, 2023

SUBMITTED TO

David Pate
Senior Environmental Engineer
David.Pate@Clevelandcliffs.com

Cleveland-Cliffs
Dearborn Works
4001 Miller Rd
Dearborn, Michigan 48120

SUBMITTED BY

Brad Bergeron, A.Sc.T., d.E.T.
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TABLE OF CONTENTS

LIST OF TABLES

(Found Within the Test Plan)

LIST OF APPENDICES

(Found After the Test Plan)

1 INTRODUCTION

RWDI USA LLC (RWDI) has been retained by Cleveland-Cliffs Dearborn Works (CCDW) to complete the emission sampling program at their facility located at 4001 Miller Road, Dearborn, Michigan. The purpose of the emissions test program is to verify emissions required by Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit MI-ROP-A8640-2016a as well as to evaluate emissions after the completion of the Dearborn Works' ESP Rebuild Project. The test program will consist of testing for filterable particulate matter (FPM), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), lead (Pb), manganese (Mn), and visible emissions (VE) from the Electrostatic Precipitator (ESP) and Pb and Mn from the Secondary Emission Control (SEC) Baghouse. Pb and Mn testing will be performed simultaneously on the ESP and the SEC Baghouse. Condensable Particulate Emissions (CPM) will be measured from the ESP along with the FPM testing and $PM_{2.5}$ and PM_{10} emissions will be reported as the sum of FPM and CPM.

1.1 Test Program Contacts

Table 1.1: Testing Personnel

David Pare	**Cleveland-Cliffs Dearborn Works**	**(313) 323-1261**
Brad Bergeron	**RWDI USA LLC** **2239 Star Court** **Rochester Hills, MI** **48309**	**(248) 234-3885**
Steve Smith		**(734) 751-9701**
Mason Saksnaug		**(989) 323-0355**

1.2 Test Dates

RWDI is proposing to complete the testing program during the week of May 15th, 2023 with testing taking place on May 16-17. The following is a summary of the proposed timetable for this testing. It is anticipated that sampling will be conducted on a quarterly basis following this test protocol for subsequent testing.

Table 1.2: Summary of Testing Schedule

Sampling Location	Parameter	Sampling Method	Number of Runs	Run Duration	Time On-Site
May 15th, 2023					
Dearborn Works	Arrive on site and set up test equipment				
May 16th, 2023					
EUBOF ESP Electrostatic Precipitator (ESP) SVBOFESP	Flow	EPA Method 1 and 2	Two (2)	Minimum of 60 minutes and 2 Heats	12 Hours
	Oxygen and Carbon Dioxide	EPA Method 3A or Method 3 by Fyrite	Two (2)		
	Moisture	EPA Method 4	Two (2)		
	Particulate Matter	EPA Method 5	Two (2)		
	Condensable Particulate Matter	EPA Method 202	Two (2)		
	Metals (Lead and Manganese)	EPA Method 29	Two (2)		
	Visual Emissions	EPA Method 9	Two (2)		
FGBOFSHOP Secondary Emissions Capture (SEC) SVBOFBH	Flow	EPA Method 1 and 2	Two (2)		
	Oxygen and Carbon Dioxide	EPA Method 3 by Fyrite	Two (2)		
	Moisture	EPA Method 4	Two (2)		
	Metals (Lead and Manganese)	EPA Method 29	Two (2)		
May 17th, 2023					
EUBOF ESP Electrostatic Precipitator (ESP) SVBOFESP	Flow	EPA Method 1 and 2	One (1)	Minimum of 60 minutes and 2 Heats	12 Hours
	Oxygen and Carbon Dioxide	EPA Method 3A or Method 3 by Fyrite	One (1)		
	Moisture	EPA Method 4	One (1)		
	Particulate Matter	EPA Method 5	One (1)		
	Condensable Particulate Matter	EPA Method 202	One (1)		
	Metals (Lead and Manganese)	EPA Method 29	One (1)		
	Visual Emissions	EPA Method 9	One (1)		
FGBOFSHOP Secondary Emissions Control (SEC) SVBOFBH	Flow	EPA Method 1 and 2	One (1)		
	Oxygen and Carbon Dioxide	EPA Method 3 by fyrite	One (1)		
	Moisture	EPA Method 4	One (1)		
	Metals (Lead, Manganese, and Mercury)	EPA Method 29	One (1)		

1.3 Description of Source

CCDW is a steel-producing facility. Scrap metal is charged into the basic oxygen furnace (BOF) vessel and then molten iron is charged into the vessel on top of the scrap. Fluxing agents are also added during the steelmaking process. Oxygen is blown into the molten iron/scrap mixture causing the scrap to melt and refining the iron into steel by reducing the carbon content. The heat from the steelmaking process comes from the reaction of oxygen with the dissolved carbon in the molten iron.

The emissions are controlled by an ESP (SVBOFESP). The emissions enter the ESP where the particulate is electrically charged. The charged particles then flow over positively charged collector plates, where the particles are collected. Vibration to both the discharge electrodes and the collection plates dislodge the particulate matter. The exhaust gas is then discharged from the ESP outlet.

The BOF also utilizes a secondary emission control (SEC) baghouse (SVBOFBH). The SEC baghouse controls particulate emissions during the hot metal charging and tapping operations during the steel making process. The SEC baghouse also controls emissions generated by the iron reladling operation.

1.4 Type and Quantity of Raw and Finished Material

Approximately 250 tons of molten steel is produced at the BOF during each heat.

1.5 Operating Parameters Used to Regulate Process

The main operating parameters that regulate the process at the BOF are oxygen blow rate and production rate. During the various BOF operations, fan suction pressure (i.e., draft) and louver positions are controlled to draw the fumes through the hoods and ductwork for both the ESP and SEC baghouse based on which operations are occurring within the BOF vessel. Louvers are in place on each of the two vessel uptakes to the ESP. Each vessel has 2 charging louvers and a tapping louver to direct emissions to the SEC Baghouse. An additional louver directs flow to the SEC Baghouse at the hot metal transfer station

1.6 Rated Capacity of Process

Approximately 250 tons per batch.

2 AIR POLLUTION CONTROL EQUIPMENT

2.1 Type of Control Device

The BOF utilizes an ESP and a baghouse to control emissions. The ESP consists of 5 casings in parallel. Casings 1 through 4 consist of 10 fields. Casing 5 consists of 6 fields that are functionally equivalent to 10 fields in the other casings. This equates to 50 equivalent ESP fields. The baghouse is a 14 compartment reverse-air style baghouse with a tared capacity of 1,000,000 ACFM.

2.2 Operating Parameters

Key ESP operating parameters are draft, opacity from the continuous opacity monitor, and secondary power levels for each of the fields. The key operating parameters for the SEC baghouse are fan speed, louver positions, plenum pressure, and differential pressure.

2.3 Maintenance on Equipment in Last Three Months

Routine maintenance is conducted on each control device on daily, monthly, and quarterly increments. These activities are detailed in Operation and Maintenance (O&M) plans. No significant unplanned maintenance has occurred in the last three months on the secondary baghouse. The ESP has been undergoing a complete rebuild with one casing scheduled completely rebuilt and placed into service around the end of March. This represents the final casing to be rebuilt.

3 APPLICABLE PERMIT

The sources operate under Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operating Permit MI-ROP-A8640-2016a. In addition, the testing discussed in this plan will be part of a consent decree with EPA and EGLE that is currently being negotiated.

4 POLLUTANTS TO BE MEASURED

The SEC baghouse and ESP will be tested simultaneously testing for lead and manganese. The ESP will also be tested for FPM , CPM, and visible emissions. $PM_{2.5}$ and PM_{10} emissions will be calculated as the sum of the FPM and CPM fractions. Table 4.1 lists the emission limits for each parameter tested.

Table 4.1: Emission Limits

Source	Parameter	Emission Limit
BOF ESP	PM	0.0152 gr/dscf
		62.6 lb./hr.
	PM_{10}	47.5 lb./hr.
	$PM_{2.5}$	46.85 lb./hr.
	Opacity	20%, 6-minute average (1)
BOF SEC Baghouse	Manganese	0.07 lb./hr.
BOF ESP and SEC Baghouse Combined	Lead	0.067 lb./hr.
	Manganese	0.10 lb./hr.

(1) One 6-minute average opacity of up to 27% is exempt per hour

5 SAMPLING AND ANALYSIS PROCEDURES

The emission test program will utilize the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A)

- Method 1 – Sample and Velocity Traverses for Stationary Sources
- Method 2 – Determination of Stack Gas Velocity and Volumetric Flowrate
- Method 3 – Gas Analysis for the Determination of Molecular Weight (fyrite)
- Method 3A – Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- Method 4 – Determination of Moisture Content in Stack Gases
- Method 5 – Determination of Particulate Matter Emissions from Stationary Sources
- Method 9 – Visual Determination of the Opacity of Emissions from Stationary Sources
- Method 29 – Determination of Metals Emissions from Stationary Sources
- Methos 202 – Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources
- Method 205 – Verification of Gas Dilution Systems for Field Instrument Calibrations

5.1 Stack Velocity, Temperature, and Volumetric Flow Rate USEPA Method 1-4

The exhaust velocities and flow rates will be determined following U.S. EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)". Velocity measurements will be taken with a pre-calibrated S-Type pitot tube and incline manometer or digital manometer. Volumetric flow rates will be determined following the equal area method as outlined in U.S. EPA Method 2. Temperature measurements will be made simultaneously with the velocity measurements and will be conducted using a chromel-alumel type "k" thermocouple in conjunction with a calibrated digital temperature indicator.

The dry molecular weight of the stack gas will be determined following calculations outlined in U.S. EPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight" or per Method 2 - 8.6 For processes emitting essentially air, an analysis need not be conducted, use a dry molecular weight of 29.0 at the SEC baghouse.

Stack moisture content will be determined through direct condensation from the PM or metals sampling trains according to U.S. EPA Method 4, "Determination of Moisture Content of Stack Gases".

5.2 Oxygen and Carbon Dioxide USEPA Method 3A

USEPA Method 3A is an instrumental test method used to measure the concentration of oxygen and carbon dioxide in stack gases. The stack gas is continuously sampled by the CEMS. Either USEPA Method 3A or USEPA Method 3 will be used on the ESP stack.

5.3 Gas Dilution System USEPA Method 205

Calibration gas will be mixed using an Environics 4040 Gas Dilution System. The mass flow controllers are factory calibrated using a primary flow standard traceable to the United States National Institute of Standards and Technology (NIST). Each flow controller utilizes an 11-point calibration table with linear interpolation, to increase accuracy and reduce flow controller nonlinearity. The calibration is done yearly, and the records will be included in the Source Testing Report. A multi-point EPA Method 205 check will be executed in the field prior to testing to ensure accurate gas-mixtures. The gas dilution system consisting of calibrated orifices or mass flow controllers and dilutes a high-level calibration gas to within ±2% of predicted values. The gas divider is capable of diluting gases at set increments and will be evaluated for accuracy in the field in accordance with US EPA Method 205 *"Verification of Gas Dilution Systems for Field Instrument Calibrations"*. The gas divider dilutions will be measured to evaluate that the responses are within ±2% of predicted values. In addition, a certified mid-level calibration gas within ±10% of one of the tested dilution gases will be introduced into an analyzer to ensure the response of the gas calibration is within ±2% of gas divider dilution concentration.

5.4 Particulate Matter and Condensable Particulate Matter USEPA Method 5/202

Filterable particulate matter will be collected isokinetically by USEPA Method 5, and the condensable particulate matter will be sampled by USEPA Method 202. The sampling train will consist of a stainless steel nozzle, glass-lined probe, filter, pot belly impinger, empty impinger, CPM filter, water knockout impinger, and silica gel impinger. After each test the samples will be sent to the laboratory for analysis. A schematic of the sampling train is included in Appendix A.

5.5 Metals (Lead, Manganese, and Mercury) USEPA Method 29

A sample of stack gas will be drawn from the stack isokinetically to measure metals. The sampling train will consist of a glass nozzle or Teflon coated nozzle, a glass-lined probe, quartz filter, and 4-7 impingers in series. Particulate metals are collected in the nozzle, probe, and filter. The gaseous emissions are collected in the back half impingers with the first two impingers containing acidified hydrogen peroxide, an empty third impinger and, if mercury is being measured, two impingers containing acidified potassium permanganate. The final impinger will contain silica gel. The recovery process will follow USEPA Method 29, and all samples will be sent to the laboratory for analysis. A schematic of the sampling train is included in Appendix A.

5.6 Visual Emissions USEPA Method 9

Visual opacity will follow USEPA Method 9. A certified observer will stand at a distance to provide a clear view of the emissions with the sun oriented in the 140 degree sector at their back. Observations will be taken every 15-seconds. One minimum 60-minute, 1 heat observation will be conducted during each particulate matter test run.

5.7 Method Deviations

1. CCDW operates two BOF Vessels that exhaust to the common ESP. While oxygen blowing can only take place on one vessel at a time, oxygen blowing could be occurring on a vessel while performing charging, tapping, and deslagging on the other vessel. Some overlapping into a heat on the other vessel at the end of a production cycle could occur. All tests will end at the end of the production cycle regardless of what is taking place on the other vessel. Production will be prorated to account for these occurrences where there is overlap.
2. No port changes will take place while is oxygen blowing on the ESP. When it is time for a port change, the probe will be left at the same port and the points will be re-traversed until the oxygen blow has been completed. The probe will then be moved to the next port and testing will be resumed at the first point.
3. In cases where the end of the sampling run does not correspond with the end of a heat, the points will be traversed in reverse order until the heat has been completed.
4. Each batch consists of 5 steps: 1) scrap charge; 2) hot metal charge; 3) oxygen blowing; 4) tapping; and 5) deslagging. It is a common occurrence for the scrap charge to take place at a time that is far in advance of charging hot metal. For this reason, there could be occasions where starting the test on a hot metal charge is desirable as it is a better indicator of when the batch is actually starting. In these cases, Cleveland-Cliffs is proposing that the integral heat requirement be satisfied by testing during the scrap charge of the following heat.

6 NUMBER AND LENGTH OF SAMPLING RUNS

Three (3) minimum 60-minute tests will be conducted simultaneously at each location. Each run will consist of a minimum of 2 complete heats. Due to process constraints and the method deviations noted above, each test may take approximately 2-4 hours to complete.

7 STACK INFORMATION

Table 7.1: Summary of Exhaust Parameters

Source	Parameter	Diameter	Approximate Duct Diameters from Flow Disturbance	Number of Ports	Points per Traverse	Total Points per Test
SVBOFESP	**Methos 1-5, 202, 29, 3A, and 9**	**204"**	**~7 downstream and ~2 upstream**	**2**	**12**	**24**
SVBOFBH	**Method 29**	**222"**	**~6 downstream and ~2 upstream**	**2**	**12**	**24**

8 ANTICIPATED FLUE GAS CONDITIONS

Table 8.1: Anticipated Flue Gas Conditions

Source	Concentration			
	Flowrate	**Moisture**	**Temperature**	**O2/CO2**
SVBOFESP	**440,000 dscfm**	**10-15%**	**250F**	**19% O2 3% CO2**
SVBOFBH	**500,000 dscfm**	**2%**	**120F**	**21% O2 0% CO2**

9 PROCESS OPERATING CONDITIONS

Testing will be conducted under normal operating shop conditions. For the ESP, testing will be conducted with an anticipated 30 equivalent fields in service. The test will be used to establish an Operating Standard for the ESP as defined in the draft consent decree received by Cleveland-Cliffs on February 17, 2023.

10 PROCESS DATA COLLECTED

The following process data will be collected by Cleveland-Cliffs personnel during the testing:

- Steel Production rate, TPH
- Start and stop time of each steel production cycle
- Average oxygen blow rate per heat
- Start/stop times of charging, tapping, reladling per heat
- Number and identification of ESP casings, compartments, and fields in operation
- ESP COMS data, 6-minute and 1-hour block average date
- Baghouse pressure drop and bag leak detector reading per run
- Number of baghouse fans in operation, damper positions, and fan speeds
- Identification of baghouse compartments in operation per heat
- Average ESP draft per heat

11 MONITORING DATA

Opacity is monitored continuously at the ESP and is reported as 1-hour and 6-minute averages. A continuously operated bag leak detection system is in operation on the BOF Secondary Baghouse.

12 FIELD QA/QC

Sample collection and analysis will follow USEPA Methods 1-5, 29, 202, 9, 3A, and 205.

13 LABORATORY QA/QC

Laboratory data will be sent to Bureau Veritas for analysis. RWDI will perform the filterable PM analysis.

14 REPORTING

The emission test report will follow the format found on page 3 of the EGLE/Air Quality Division's Format for Submittal of Source Emission Test Plans and Reports. Included in the report will be a site description with the reason for testing, source descriptions, a summary of results, our sampling and analytical procedures, and test results and discussion. Source test results will be submitted to the EGLE Air Quality Division – Technical Program Unit and Southeast Michigan District Office, the EGLE Detroit District Office, and USEPA within 60 days of completion of the testing. The proposed Table of Contents for the source testing report will be as follows:

14.1 Data Analysis

All data will be presented in tabular form, an example of which follows:

Table X: Average Emission Data

Location	Parameter	Emission Rate			
		Run 1	**Run 2**	**Run 3**	**Average (Highest for Opacity)**
EUBOFESP	**PM and CPM**	XX gr/dscf XX lb/hr	XX gr/dscf XX lb/hr	XX gr/dscf XX lb/hr	XX gr/dscf XX lb/hr
EUBOFSHOP SECBH and FGBOFSHOP SECBH	**Mercury**	XX lb./hr.	XX lb./hr.	XX lb./hr.	XX lb./hr.
	Lead	XX lb./hr.	XX lb./hr.	XX lb./hr.	XX lb./hr.
	Manganese	XX lb./hr.	XX lb./hr.	XX lb./hr.	XX lb./hr.
EUBOFESP	**Visual Emissions**	XX %	XX %	XX %	XX %

15 SAFETY

The following table outlines the additional safety requirements for this survey as identified by RWDI.

Head Protection	**Required**
Foot Protection	**Required – Boots must have built in Metatarsal Guards**
Eye Protection	**Required – Glasses required on safety glasses**
Hearing Protection	**Required**
COVID-19 Precautions	**None**
Safety Belt or Harness	**SEC Baghouse Requires a Climbing Harness**
Respiratory Equipment with combined Acid Gases and Particulate Cartridges	**Not Required**
Other Protective Clothing or Equipment	**Flame retardant long sleeve shirts and pants (i.e., greens)**
Safety Training Session	**Required**
Date of Session, if Required	**Prior to May 15th, 2023**
Sampling Location	**Outdoors**
Temperature of Sampling Location	**Ambient**
Work Area	**Outdoors and in Sampling Trailer**

16 PERSONNEL RESPONSIBLE

16.1 Test Site Organization

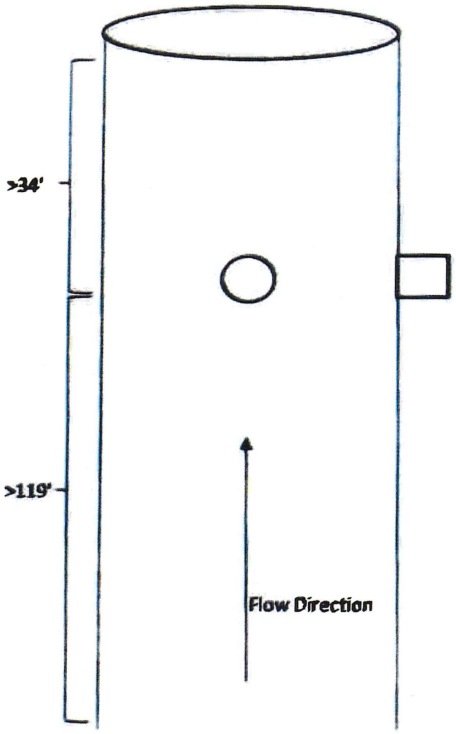
The following individuals are responsible for the key tasks during the survey.

Task	Individual
Project Management:	Steve Smith, RWDI
Test Preparation/Site Restoration:	David Pate, Cleveland-Cliffs
Modifications to Facility/Services:	David Pate, Cleveland-Cliffs
Sample Site Accessibility:	David Pate, Cleveland-Cliffs
Data Recovery:	Mason Sakshaug, RWDI
Sample Schedule:	Steve Smith, RWDI

16.2 Test Preparations

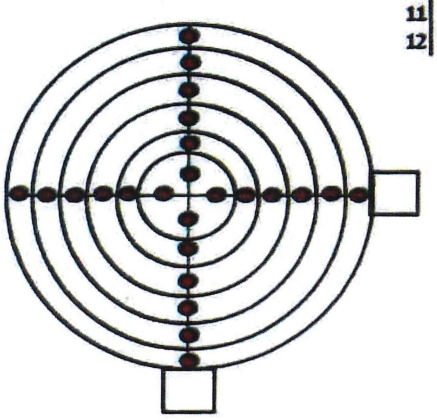
Personnel at the CCDW facility will ensure that the SEC baghouse and ESP are operating at acceptable, representative capacity during the source testing. CCDW personnel will also ensure that RWDI field crew has access to shelter, sampling ports and electrical power or provisions made to obtain temporary power.

APPENDIX A



Diameter: 204

Sampling Points (in.)	
1	4.28
2	13.67
3	24.07
4	36.11
5	51.00
6	72.62
7	131.38
8	153.00
9	167.89
10	179.93
11	190.33
12	199.72

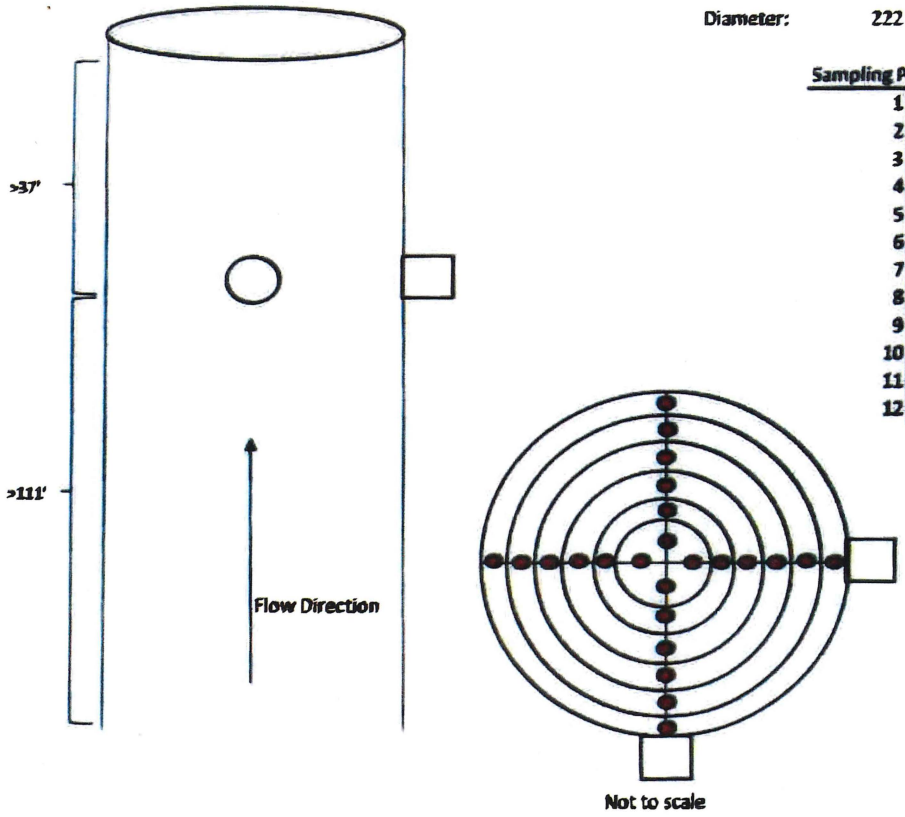


Not to scale

ESP
Cleveland-Cliffs
Dearborn Works
Dearborn, Michigan

Date:
Week of May 15, 2022

RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309



Diameter: 222

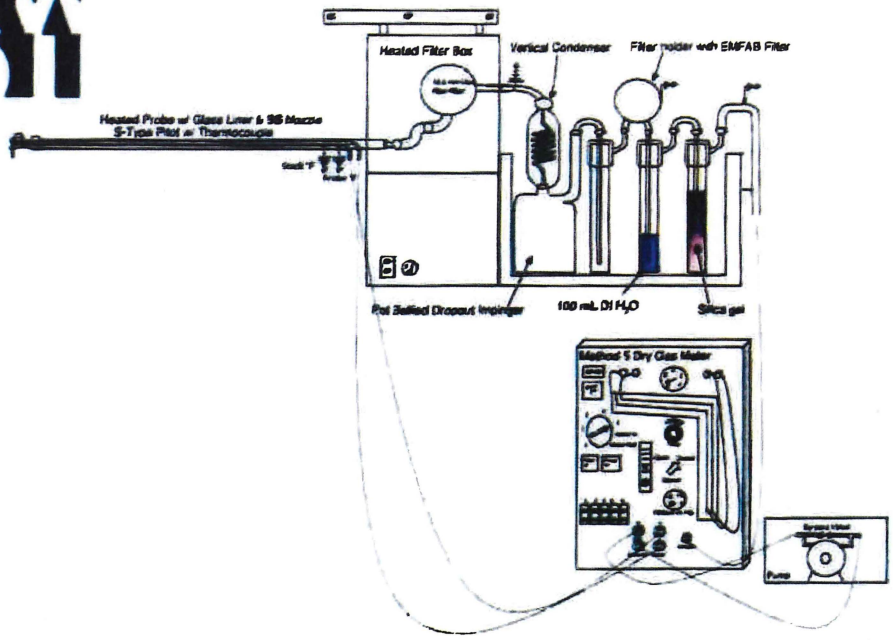
Sampling Points (in.)	
1	4.66
2	14.87
3	26.20
4	39.29
5	55.50
6	79.03
7	142.97
8	166.50
9	182.71
10	195.80
11	207.13
12	217.34

Not to scale

SEC Baghosue
Cleveland-Cliffs
Dearborn Works
Dearborn, Michigan

Date:
Week of May 15, 2022

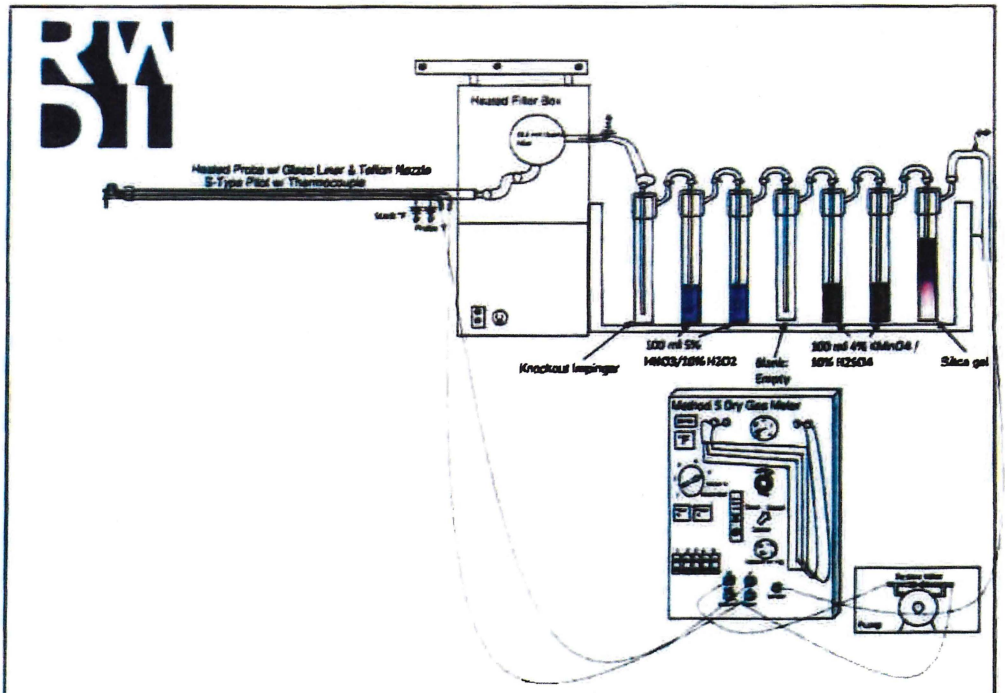
RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309



USEPA Method 5/202

Cleveland-Cliffs
Dearborn Works
Dearborn, Michigan

Week of May 15, 2023



USEPA Method 29
Cleveland-Cliffs
Dearborn Works
Dearborn, Michigan

Week of May 15, 2023

Attachment B

Requested methodology change for Oxygen and Carbon Dioxide measurement

2239 Star Court
Rochester Hills, MI
48309

Tel: +1 248.841.8442
E-mail: solutions@rwdi.com

September 22, 2023

David Pate
Cleveland-Cliffs Corporation Dearborn Works
4001 Miller Road
Dearborn, MI 48120
David.Pate@clevelandcliffs.com

Re: Cleveland-Cliffs Steel Corporation Dearborn Works – Test Plan Addendum to Basic Oxygen Furnace Shop Operations Test Plan, RWDI Reference No. 2303982.

RWDI USA LLC (RWDI) is proposing a change in methodology as an addendum to the test protocol for the measurement of oxygen and carbon dioxide for determination of stack gas molecular weight. The current test plan states the following:

> USEPA Method 3A is an instrumental test method used to measure the concentration of oxygen and carbon dioxide in stack gases. The stack gas is continuously samples by the CEMS. Either Method 3A or Method 3 will be used on the ESP stack.

The full application of Method 3A encompasses a great deal of equipment and labor for the ESP and SEC Baghouse. As the oxygen and carbon dioxide is only used for molecular weight calculation, this effort is not necessary. RWDI is proposing that integrated bag samples be collected each run and that they be analyzed in the following manner using O_2/CO_2 gas analyzers. In the opinion of RWDI, this methodology provides superior data quality than that obtained when using an orsat or fyrite analyzer on an integrated bag sample.

> The dry molecular weight of the stack gas will be determined following calculations outlined in U.S. EPA Method 3/3A, "Gas Analysis for the Determination of Dry Molecular Weight (Instrumental) for the ESP and SEC. RWDI will collect integrated sample bags for each of the ESP and SEC using the orsat pump from the sampling consoles. The integrated bag samples will be collected over the duration of each test period. The bag samples will be delivered to our continuous monitoring system for CO_2 and O_2 measurements. The CO_2 and O_2 analyzers will be operated according to USEPA Method 3A. Prior to testing, a 3-point analyzer calibration error check will be conducted using USEPA protocol gases. The calibration error check will be performed by introducing zero, mid and high-level calibration gases directly into the analyzer. The calibration error check will be performed to confirm that the analyzer response is within ±2% of the certified calibration gas introduced. Prior to each test run, a system-bias test will be performed where known concentrations of calibration gases were introduced prior to the chiller into the the analyzers response was within ±5% of the introduced calibration gas concentrations.

At the conclusion of each set of bag samples a system-bias check will be performed to evaluate the percent drift from pre and post-test system bias checks. The system bias checks will be used to confirm that the analyzer did not drift greater than ±3% throughout a test run.

Zero and upscale calibration checks will be conducted both before and after each set of bag samples in order to quantify measurement system calibration drift and sampling system bias. Upscale is either the mid- or high-range gas, whichever most closely approximates the flue gas level. During these checks, the calibration gases will be introduced into the sampling system at a conjunction where the sample bag would be introduced to ensure that system was working properly. The analyzers will be calibrated on-site using EPA Protocol No. 1 certified calibration mixtures.

If you have any questions or concerns concerning this methodology change, please feel free to reach out to me.

Yours truly,

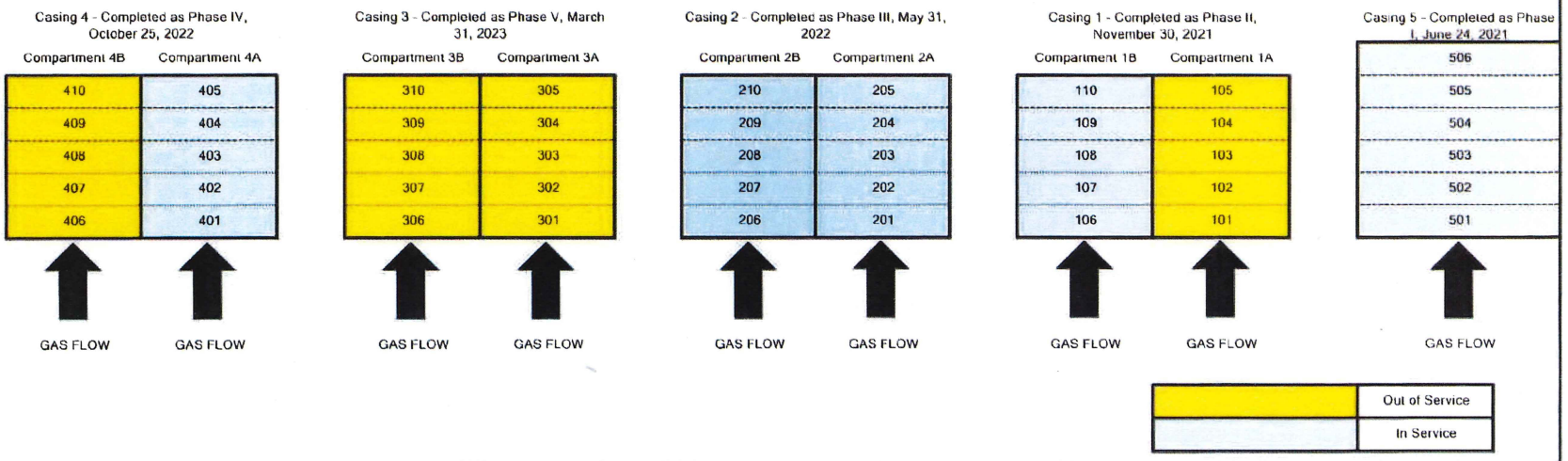
Brad Bergeron, A.Sc.T., d.E.T.
Technical Director / Principal
RWDI

Attach.

Attachment C

Layout of ESP Fields in service for November 21 testing

OUTLET MANIFOLD



INLET MANIFOLD

Notes: Fields 501 to 506 are equivalent to 1.67 of all other fields. Each casing contains 10 equivalent fields.

Orientation presented is from facing the ESP - Looking East

CLEVELAND-CLIFFS INC.
Cleveland-Cliffs Steel Corporation
Dearborn Works
4001 Miller Road, Dearborn, MI 48120
P 313.317.8900 clevelandcliffs.com

October 25, 2023

Ms. Katherine Koster
Senior Environmental Engineer
EQLE, AQD, Detroit District
3058 West Grand Boulevard, Suite 2-300
Detroit, Michigan 48202

Ms. Jenine Camilleri
Enforcement Unit Supervisor
EQLE, AQD
P.O. Box 30260
Lansing, Michigan 48909-7760

Re: Cleveland-Cliffs Dearborn Works
Response to Violation Notice dated January 19, 2023

Dear Mss. Koster and Camilleri:

I am writing on behalf of Cleveland-Cliffs Dearborn Works in response to the Violation Notice dated October 6, 2023. The Violation Notice alleges that Cleveland-Cliffs exceeded its permit limit for Manganese for the FGBOFSHOP Secondary Baghouse and ESP stacks combined during stack testing conducted on August 1-2, 2023.

Cleveland-Cliffs provided EGLE with a detailed analysis of the test results in its Notification of Retest submitted on September 1, 2023 and included with this response as attachment A. In short, the following inconsistencies and conclusions were noted:

- The test results for manganese were extremely inconsistent. This is in contrast to the test results for PM, PM2.5 / PM10, and lead which were consistent across the test runs.
- The overwhelming portion of the manganese was present within the post-filter (back half or condensable) part of the sampling train. This contrasts with the distribution of manganese in previous stack tests on the ESP.
- The test results are not indicative of any deficiency in the operation of the ESP because the ESP is incapable of controlling condensable particulate and hence condensable manganese. The results are either an extreme outlier or are influenced by some form of sample contamination that was outside the control of Cleveland-Cliffs.
- The possibility of sample contamination is also supported by the fact that the elevated condensable manganese was only present in two of the three runs and was not present in the concurrent testing of the secondary baghouse.

Cleveland-Cliffs conducted a re-test on the ESP and SEC Baghouse on September 19-20, 2023. The results of that testing were in compliance with all emission limits, including manganese. Notably, approximately 96% of the manganese emissions from the ESP during the retest were filterable. This is in line with previous historical data prior to the August 1-2, 2023 test. ESP operating conditions for the September 19-20 retest were nearly identical to the August 1-2 testing in that both tests were conducted with 30 ESP fields in service with all casing No. 2 and a compartment in both casings No. 1 and No. 3 out of service. ESP performance based on an examination of the PM test results was likewise very similar (PM grain loading was 0.0021 gr/dscf for the retest and 0.0024 gr/dscf for the August testing. PM pounds per hour was 7.9 lbs/hr for the retest and 8.8 lbs/hr for the August testing). Detailed preliminary results for the retest were provided to EGLE in the transmittal letter for the August 1-2, 2023 stack test report which is included with this response as attachment B.