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HORSEHEAD CORPORATION
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February 19, 2015

Mr. Otis Omenazu
Chief Air Engineer
Department of Public Health
City of Chicago
333 South State Street, Suite 200
Chicago, IL. 60604

Re: Horsehead Corporation June 13, 2014 Variance Request - Response to January 26, 2015 Request for Additional Information

Dear Mr. Omenazu:

On behalf of Horsehead Corporation ("Horsehead"), this letter responds to your January 26, 2015 letter and provides the additional information you requested regarding Horsehead's variance application dated June 13, 2014. Horsehead's application sought a variance from certain of the City of Chicago Air Pollution Control Rules and Regulations for Control of Emissions from Handling and Storage of Bulk Material Piles (the "Rules"). This response provides the following information:

(a) Horsehead's decision not to pursue a variance from Section 3.0(2)(c) of the Rules pertaining to the use of Method 9 to measure opacity and from Section 3.0(8)(d) of the Rules pertaining to the use of a wheel wash station and rumble strips;

(b) Horsehead's completion of the activities for which it previously requested an extension of time;

(c) Additional information in support of Horsehead's request for a variance from Sections 3.0(4) and 5.05(b) of the Rules which require, respectively, the installation, operation and maintenance of fugitive dust monitors and the application of dust suppressants when temperatures fall below 32° F.

Each of the above categories is discussed in further detail below. Horsehead submits that the additional information provided in this response, together with the information contained in Horsehead's June 13, 2014 variance application, satisfies Horsehead's burden of proof to obtain the requested variance relief pursuant to Section 8.0 of the Rules.

I. Clarification of Section 3.0(2)(c) of the Rules (Use of Method 9) to measure opacity and Section 3.0(8)(d) Wheel Wash Station and Rumble Strip Provisions (CDPH January 26, 2015 Letter at Paragraphs 1 and 3)

In Horsehead's variance application, it sought a variance from the requirements of Sections 3.0(2)(c) and 3.0(8)(d) of the Rules. In paragraph 1 of the Chicago Department of Public Health's ("CDPH") January 26, 2015 letter, it noted the subsequent correction the CDPH made to Section 3.02(c) that changed the reference from 35 Ill. Admin. Code 212.107 to 35 Ill. Admin. Code 212.109. The CDPH further confirmed that under this corrected reference to Section 212.109, Method 9 is the correct method for measuring opacity under the Rules and therefore, a variance request to use Method 9 to measure opacity is not required. The CDPH requested that Horsehead advise if it still seeks a variance from any part of Section 3.0(2)(c). Horsehead appreciates the City's clarification that Method 9 is an allowed test method for measuring opacity. Horsehead agrees that a variance from Section 3.0(2)(c) is not required and confirms that it is not seeking a variance from any part of this section.

Horsehead also sought a variance from the requirement in Section 3.0(8)(d) regarding the installation of a wheel wash station and rumble strips. At the time Horsehead submitted its variance request, it was not certain that the Rules allowed the use of alternative measures to a wheel wash station and rumble strips to ensure that trucks leaving its Chicago plant will not cause track-out of materials onto the public way. Paragraph 3 of the CDPH January 26, 2015 letter clarifies that Section 3.08(d) does not mandate the use of a wheel wash station and rumble strips if other measures are specified in the plant's Fugitive Dust Plan to prevent track-out of materials. The CDPH correctly notes that Horsehead's June 11, 2014 Fugitive Dust Plan includes a discussion of truck cleaning and roadway cleaning. Therefore, the CDPH requests that Horsehead withdraw its variance request if Horsehead believes that the materials submitted adequately demonstrate that the measures it uses are effective to ensure that trucks do not cause track out from the facility onto the public roadway. Based on the City's clarification of the requirements of Section 3.0(8)(d), Horsehead has decided to withdraw its request for a variance from this section of the Rules.

II. Horsehead's completion of the activities for which it previously requested an extension of time. (CDPH January 26, 2015 Letter at Paragraph 5)

In paragraph 5 of the CDPH January 26, 2015 letter, the CDPH correctly notes that for the three items in Horsehead's variance request for which it asked for an extension of time, the timeframe in the three extension requests has since passed. The CDPH requests that Horsehead advise whether or not a further extension of time is needed.

Horsehead does not need a further extension of time for the three items included in its June 13, 2014 variance request. Horsehead has completed the installation of a wind monitoring station to comply with the requirement in Section 3.0(5) of the Rules. Horsehead also has completed the work necessary to have a dust suppressant system available "at all times" for its outdoor IRM storage areas as required in Section 5.0(5)(a) of the Rules. Finally, Horsehead completed the grading work necessary to reduce the height of all of its IRM storage piles to satisfy the 30-foot height restriction in Section 5.0(5) of the Rules.

II. Response to CDPH Requests for Additional Information (CDPH January 26, 2015 Letter at Paragraphs 2 and 4)

Horsehead requested a variance from Section 3.0(4) of the Rules that requires the installation, operation and maintenance of fugitive dust monitors and from Section 5.05(b) of the Rules that requires the application of dust suppressants when temperatures fall below 32°F. The CDPH January 26, 2015 letter requests that Horsehead submit additional information concerning these two requests. The requested information is provided below.

A. Fugitive Dust Monitors

Paragraph 2 of the CDPH's January 26, 2015 letter requests additional detailed information demonstrating that there will be no off-site fugitive dust impacts from the material handling activities conducted at the Horsehead Chicago Plant and that installing the fugitive dust monitors would cause an unreasonable hardship. More specifically, the CDPH correctly notes that included in the supporting information Horsehead submitted were the "results of opacity testing showing that the opacity at the facility during the two test days was 0% with a limited exception that did not exceed 5%." The CDPH further stated that the opacity testing documentation evidencing the testing performed at a number of locations "did not explain whether or not the test observed the full range of activities that are conducted at the site, including mixing and processing, bull dozing and grading, drop operations, and vehicle and equipment travel over bulk materials."

While Horsehead will address the CDPH's specific question regarding the Horsehead Chicago Plant activities that were ongoing at the time of the May 2014 opacity testing addressed in the CDPH's January 26, 2015 letter, since the variance application was submitted there have now been two additional quarters of opacity testing conducted at the plant. The reported results of the third and fourth quarter 2014 opacity testing are enclosed with this response as Exhibits A and B, respectively. The results are summarized below. For all three quarters of opacity testing conducted to date, the testing was performed in the location of storage piles and transfer points for IRM and coke, as well as for roadways and parking areas. The testing was conducted during dry conditions *(i.e.,* there was no precipitation during testing) and also captured windy conditions.

The additional 2014 quarterly opacity testing results provide further detailed information demonstrating that there will be no off-site fugitive dust impacts from the material handling activities at the Horsehead Chicago Plant. The opacity testing has monitored all of the bulk solid materials activities which are conducted at the plant. There also has been on-site vehicle traffic occurring during each of these tests. A more detailed description of the bulk solid materials handling activities and on-site vehicle traffic that were occurring during the time of the opacity testing during each of the three quarters of the 2014 opacity testing is provided below.

1. Second Quarter (May 2014) Opacity Testing Conditions and Results

The results of the May 19, 2014, and May 23, 2014 opacity tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to Sections

3.0(2)(a) and (b), respectively, of the Rule, with most of the readings showing 0% opacity. The highest opacity reading was 5%. There were no visible emissions at the property lines. A copy of the May 19, 2014 and May 23 Opacity Testing Reports were attached as Exhibit N and O, respectively, to Horsehead's variance request.

First day of Testing: On the first day of opacity testing (May 19), the recorded wind ranged from 10 mph to 15 mph. (The National Weather Service (NWS) data for Chicago Midway Airport on May 19 shows wind conditions ranging from 14 to 17 mph, with gusts ranging from 21 to 31 mph during this time period.) A total of 14 locations were tested by a certified observer in accordance with Method 9 (for internal locations) and Method 22 (for property line locations), including five locations along the property boundary line: east, south, southwest corner, west and north. Based on the south, southeast wind direction at the time of the opacity testing, the west and north property line locations were downwind. In addition to the property boundary line locations, several internal locations also were tested. These included bulk solid materials storage area locations (*i.e.,* various IRM and petcoke/metcoke storage areas). In addition, an opacity test was conducted during a truck loading operation at an IRM storage pile.

Second day of Testing: The second day of opacity testing, May 23, 2014, coincided with IRM barge loading operations, including both the transfer of IRM from the front-end loader vehicle into the conveyor hopper and the operation of the conveyor to load IRM onto the barge. The barge-loading was not occurring at the time of the May 19, 2014 opacity testing and the May 23 tests were deliberately scheduled to coincide with this activity. Wind conditions ranged from 0 to 10 mph during this activity. Opacity readings also were taken at multiple unpaved roadway locations as various vehicles (*e.g.,* car, van, tractor trailer, front-end loader) traveled over the Chicago Plant Internal Roads.

2. Third Quarter (September 2014) Opacity Testing Conditions and Results

The results of the September 15 and 16, 2014 tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to Section 3.0(2)(a) and (b), respectively, of the Rules.

First day of Testing: On the first day of opacity testing (September 15), the recorded wind ranged from calm to 9 mph. (The National Weather Service (NWS) data for Chicago Midway Airport on September 15 shows wind conditions ranging from calm to 11 mph.) Sky conditions were overcast throughout the observations.

Second day of Testing: On the second day of opacity testing (September 16), the recorded wind ranged from calm to ~6 mph. (The National Weather Service (NWS) data for Chicago Midway Airport on September 16 shows wind conditions ranging from calm to 10 mph.) Sky conditions were clear throughout observations.

The results of the Third Quarter tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to Section 3.0(2)(a) and (b), respectively, of the Rules. Opacity tests were performed at 14 different locations at the facility, which included all coke storage and handling areas, IRM storage and handling areas, paved and unpaved roadways. Additionally, there were eight property line visible emissions tests and there were no visible emissions observed. Opacity testing occurred while coke

was being loaded into the hopper, while IRM was being loaded into trucks (a total of four trucks were loaded), and while IRM was being loaded into the barge. IRM piles and the coke storage piles were not being disturbed during the tests, but coke was being unloaded into the coke loading pile during the test observation period. Paved and unpaved roadways were observed for 4 vehicle passes on each specified road during the test period.

The Method 9 opacity test results for the coke storage areas, coke pile material handling, IRM storage piles, IRM pile handling, IRM barge loading, paved roadways, and unpaved roadways were all below the 10% opacity standard promulgated in the CDPH's Bulk Storage Rules. Additionally, the Method 22 test results of visible emissions at the property boundaries showed no visible emissions crossing the plant property lines.

3. Fourth Quarter (December 2014) Opacity Testing Conditions and Results

The results of the December 15 and 19, 2014 tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to Sections 3.0(2)(a) and (b), respectively, of the Rules. Sky conditions were overcast throughout both days of observations. The test event was expanded to December 19 to include truck loading operations.

First day of Testing: On the first day of opacity testing (December 15), the recorded average wind speed ranged from 4 mph to 12 mph, with gusting to 17 mph.

Second day of Testing: On the second day of opacity testing (December 19), the recorded average wind speed ranged from 3 mph to 6 mph, with gusting to ~8 mph.

The results of the Fourth Quarter tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to CDPH Rules Sections 3.0(2)(a) and (b), respectively. Opacity tests were performed at 14 different locations at the facility, which included all coke storage and handling areas; IRM storage and handling areas; paved and unpaved roadways. Additionally, there were eight property line visible emissions tests: north property line looking east and west, east property line looking north and south, south property line looking east and west, southwest property line looking northeast, and the west property line looking north. There were no visible emissions observed. Opacity tests were performed while coke was being loaded into the hopper and observations were taken while IRM was being loaded into trucks (a total of three trucks were loaded). The coke storage piles were not being disturbed during test periods, but IRM was being added to the IRM storage area near the barge unloading process via a conveyor belt during the testing period. Paved and unpaved roadways were observed for 4 vehicle passes on each specified road during the test period. IRM barge loading was not tested because no barges were scheduled to be loaded for the remainder of the fourth quarter.

The Method 9 opacity test results for the coke storage areas, coke pile material handling, IRM storage piles, IRM pile handling, IRM truck loading, paved roadways, and unpaved roadways were all below the 10% opacity standard promulgated in the Rules. Additionally, the Method 22 test results of visible emissions at the property boundaries showed no visible emissions crossing the plant property lines.

The successful and consistent results of the three quarters of opacity testing conducted to date by Horsehead are not unexpected. They are fully consistent with the factual information Horsehead provided in its variance request concerning the nature and quantities of bulk solid materials which Horsehead handles at its Chicago Plant. First, with respect to the limited volume of coke materials which Horsehead stores at the Chicago Plant for use in its operations, the coke material comes in to the Chicago Plant at moisture levels well above the level which the Rules define as "Moist Material." Under Section 2.0 (15) of the Rules, "Moist Material" means a material with a moisture content of 3% by weight. Typically, as per the results of a daily moisture content sample analysis performed on coke material by the Chicago Plant, coke delivered to the plant contains approximately 7% moisture by weight. In addition, specified coke size is about the size of a pea. Years of experience has shown that because of the moisture content and grain size of the coke delivered to the Chicago Plant, there are not off-site fugitive emissions impacts when the coke material is off-loaded or transferred on site.

By its nature, IRM, which is the other bulk solid material handled outdoors at the Chicago Plant, is not susceptible to wind erosion. A crust forms on the IRM piles, because of the iron oxide in the material (IRM contains up to 50% iron.) The crust binds together the material in the surface of the IRM pile, essentially forming a blanket over the less-consolidated IRM material lying beneath. The density of IRM also prohibits any wind transport. The independent data generated from three quarters of third-party opacity testing results, independently demonstrates that IRM does not become airborne nor does it become mobile in surface rainwater runoff due to the character of the material, its composition, and its density. These findings are consistent with Horsehead's observations over the last several years.

The detailed information provided above and in the three quarters of opacity testing conducted to date at the Horsehead Chicago Plant clearly demonstrates that there will be no off-site fugitive dust impacts from the bulk solid material handling activities at the plant.

4. Demonstration of Arbitrary or Unreasonable Hardship

Turning to the CDPH's request for additional evidence that installing the fugitive dust monitors would cause an arbitrary or unreasonable hardship, the question of whether Section 3.0(4)'s requirements impose an unreasonable hardship on Horsehead's Chicago Plant is not limited to solely the costs associated with those monitors. The review of the hardship issue is a balancing process which must balance the hardship of complying with the monitoring requirement, which includes the imposition of additional costs, against any adverse impact on the environment. *Marathon Oil Co. v. E.P.A.*, 242 Ill.App.3d 200, 206 (1993) (interpreting the same "arbitrary or unreasonable hardship" language used in Section 35 of the Illinois Environmental Protection Act, 415 ILCS 5/35(a)). If, as here, the evidence demonstrates that there is no reasonable likelihood of any off-site fugitive dust impacts in violation of the Rules, then the costs associated with the fugitive dust monitors do not need to be as significant before the facts demonstrate that the requirement does impose an "arbitrary or unreasonable hardship." Rule §8.0(2)(e)(i); *see also* 415 ILCS 5/35(a) (authorizing variances for "arbitrary or unreasonable hardship[s]")..

Indeed, the immediate situation is similar to one the Illinois Pollution Control Board (the "Board") confronted when reviewing the variance request of a City that would

be required to immediately spend $140,000 on disinfection and monitoring equipment if forced to comply with new effluent limitations. *City of Morrison v. E.P.A.*, PCB 79-144, 1979 WL 10667 (Ill. Pol. Control Bd. Oct. 4, 1979). The Board concluded that a variance delaying the effective date of the regulation was appropriate, because there was no "particular environmental impact" that would result from granting the benefit (*e.g.,* the city was not upstream from any sensitive water bodies).

In its variance request, Horsehead provided the CDPH with the following cost information associated with the installation, operation and maintenance of the fugitive dust monitors:

- $150,000 - cost of infrastructure work (e.g, electrical power supply to monitors and construction of meteorological tower base)
- $152,000 (equipment leasing arrangement) to $157,741 (equipment purchasing arrangement) – cost of the first year of PM-10 monitoring.
- $361,741 (equipment purchasing) to $392,000 (equipment leasing) – cost of three years of monitoring with four monitors)

The above cost estimates do not include any additional time spent by Horsehead personnel regarding oversight of the PM-10 monitoring and reporting work. Also, the additional costs and effort associated with the fugitive dust monitoring requirement should properly be evaluated in the context of all of the other additional costs of compliance which the Rules have caused and will continue to cause Horsehead to incur, such as the addition of a new dust suppression system, a covered conveyor system and a wind monitoring station as explained in Horsehead's variance request. To date, these additional requirements of the Rules have caused Horsehead to incur well over $200,000 in compliance costs and the costs of operating and maintaining these systems will continue in order to maintain compliance with the City's Rules. Horsehead also is in the planning phases to construct an enclosure for its coke piles, at which point even the minimal existing potential for fugitive dust emissions will be further reduced.

In addition to the results of the three quarters of opacity testing which show that there is no reasonable likelihood of off-site fugitive dust emissions from Horsehead's operations, it should also be considered that Horsehead performs inspections and observations relating to fugitive dust controls that go beyond what is required by the Rules. As documented in Horsehead's updated Fugitive Dust Control Plan (submitted to the DPHE in January 2015), specifically Section 3.1.7 of the Plan, Horsehead conducts weekly inspections for fugitive dust at the facility's property lines and at interior property sources of fugitive dust. The forms used for these inspections are included in Appendix E of Horsehead's Fugitive Dust Control Plan. These inspections along with the quarterly opacity testing conducted pursuant to the Rules provide adequate and reasonable protection against adverse off-site impacts from fugitive dust emissions.

In conclusion, when Horsehead's variance request is viewed in its entire context, the imposition of the additional costs associated with the fugitive dust monitors when the evidence demonstrates that there will be no injury or adverse impact to the public or the

environment from granting Horsehead the variance, satisfies the "arbitrary or unreasonable hardship" burden under Section 8.0(2)(e)(1) of the Rules.

B. Below-Freezing Dust Suppression Measures

With respect to Section 5.0(5)(b), Horsehead maintains that its alternative measures for applying dust suppressants when temperatures fall below 32 degrees is adequate to prevent fugitive dust from IRM and coke piles. As stated in the updated January 2015 Fugitive Dust Plan, the nature of IRM (i.e., the crusting which occurs naturally on the IRM piles) and the higher moisture content of the coke received at Horsehead's facility are major contributing factors to why there is minimal generation of dust from these sources even under the type of weather conditions that typically promote the generation of fugitive dust. If the temperature falls below 32 degrees Fahrenheit, the facility may use either a Chemical Stabilizer, supplied by a contractor that is on-call, or suspend the disturbance of Bulk Material piles that could cause fugitive dust.

II. Response to Public Comments

In its January 26, 2015 letter, the CDPH also invited Horsehead to respond to any public comments regarding its variance request. Horsehead appreciates the opportunity to do so.

The September 2, 2014 comment filed by the Southeast Environmental Task Force and the Natural Resources Defense Council ("SETF/NRDC Comments") attached and cited to the issuance of an April 14, 2014 Notice of Violation by the U.S. EPA Region 5 (the "NOV"). The SETF/NRDC significantly mischaracterized the contents of the NOV regarding the matter of fugitive dust emissions at the Horsehead facility. The NOV did not allege that there were off-site fugitive dust emissions emanating from the Horsehead facility. Instead, the allegations that pertain to fugitive dust emissions stemmed from the alleged absence of a written fugitive dust control plan for the facility. As the CDPH is aware, there is a written fugitive dust control plan for the Horsehead facility. As required by the Rules, Horsehead submitted a written fugitive dust control plan to the CDPH in June 2014 and an updated plan in January 2015. Both the June 2014 and January 2015 versions of the fugitive dust control plan contain the required and necessary procedures and controls for preventing unacceptable off-site fugitive dust emissions both under the Rules and the requirements of the facility's Title V Permit. Further, the NOV does not allege there were actual off-site fugitive dust emissions in violation of any applicable limits. The NOV is a recitation of unproven allegations for which Horsehead does not admit the truth or accuracy and is contesting those allegations in continuing negotiations with the U.S. EPA Region 5.

The SETF/NRDC Comments also incorrectly contend that a facility cannot satisfy the requirements for a variance from the above-discussed requirement to install continuous dust monitors until and unless it has already installed the monitors and collected the continuous monitoring data. (SETF/NRDC Comments at 3-4) This is not a correct interpretation of the Rules. The Rules expressly allow for a variance from this requirement pursuant to the requirements of Section 8. Further, Horsehead has shown both by the nature of the bulk solid materials it handles, the procedures in place at its

facility to prevent off-site fugitive dust emissions and now with the results of three quarters of opacity testing that there is no reasonable potential for fugitive dust emissions from its facility to exceed the limits prescribed by the Rules. The three-quarters of opacity testing have monitored all of the activities at the facility which the SETF/NRDC Comments (at p. 4) identify as being a potential source of off-site fugitive dust emissions (e.g., material dropping operations, equipment travel and vehicle travel) which must be monitored. Thus, contrary to the SETF/NRDC's argument, there is objective and conclusive empirical testing data showing that the Horsehead facility will not cause off-site fugitive dust emissions in violation of the Rules. Horsehead has not failed to establish that it is entitled to a variance.

The SETF/NRDC Comments also challenge Horsehead's request for a variance from Section 5.0(6)(d) of the Rules' requirement to prevent "any" pooling of water at the facility. The SETF/NRDC Comments contend that Horsehead made an "unsubstantiated claim" that it is not discharging stormwater off-site, including to the adjacent Calumet River. This contention completely ignores the factual information presented in Horsehead's variance request in support of this finding. As Horsehead stated in its variance request, stormwater discharges to the adjacent Calumet River are prevented by both a berm which runs parallel to the Calumet River along the eastern side of the facility and an on-site stormwater retention basin. There are no City sewer connections at the Horsehead facility and hence, there are no entry points to the City sewer system to which stormwater may be discharged. These are undisputable facts and City inspectors have observed these stormwater controls numerous times in the past during inspections of the Horsehead facility. Horsehead provided a photograph as Exhibit D to its variance application to document the existence of the stormwater retention pond. For the record here, to avoid any doubt as to the existence of the berm, Horsehead has attached as Exhibit C photographs showing the berm. Also attached as Exhibit D is a Master Site Diagram indicating the location of the berm that protects the Calumet River from stormwater runoff.

Stormwater in the vicinity of the coke storage areas flow to collections points and is directed to the stormwater retention pond as follows.

- Storm water in the immediate area north of the larger Coke Storage Area (south of Kiln #2), flows to the storm water collection drains located just north of the Coke Storage Area.
- Storm water in the immediate area to the south, east and west of the larger Coke Storage Area flows to pit 2 directly south of the Kiln Feed Building.
- Storm water in the immediate area of the smaller Coke Storage Area and the Coke Hopper Feed Pile flows to pit 4 located adjacent to the Coke Process Hopper.

The attached Master Site Diagram (Exhibit D) also indicates this stormwater drainage in the vicinity of the coke storage areas.

Hence, this stormwater control system effectively eliminates the coke material from a vector into the Calumet River

Because of these stormwater controls and the absence of sewer connections, there is no threat of off-site stormwater discharges from the Chicago Plant.

The SETF/NRDC Comments also speculate, without any supporting information, that any pooling water at the Horsehead facility is threatening soils, subsurface materials, groundwater and "may have complex hydrologic and hydrogeologic pathways." Even assuming for argument's sake that there is a subsurface pathway from Horsehead's facility to the Calumet River, the only bulk solid materials stored at the south end of the property (the most likely area for any purported subsurface pathway to the River), are the IRM piles. IRM is not the type of material that presents environmental risks. In fact, it is a type of material that can be used to filter out certain contaminants. IRM has been the subject of studies which have identified its suitability as a material to be used for "treatment of metal bearing water and acid rock drainage (ARD)" based on the following IRM characteristics: high alkalinity, high cation exchange capacity, high adsorptive capacity, high porosity, high surface area, high strength, and high permeability. These characteristics of IRM have been described as "an almost perfect combination of desirable properties" for use in these treatment applications. Hence, based on these studies, rather than leaching materials into stormwater runoff, it is more likely that IRM that is present in any areas of pooled water at the facility serves as a "filter" that removes certain substances which may be present in stormwater. Moreover, even after IRM is used in such treatment or remediation applications, it may still be disposed of as a non-hazardous waste - - further evidence that IRM is not prone to generating harmful leachate. A copy of an abstract reporting on one such IRM study is attached to this response as Exhibit E. A full copy of the report may be found on the U.S. EPA's website for control technologies for use in contaminated site cleanup information at: http://www.clu-in.org/products/tins/tinsone.cfm?num=10370. Other technical literature reporting on IRM studies that suggests IRM acts as a passive removal medium of selected substances were cited in Horsehead's variance request.

Horsehead believes that any of the remaining issues raised in the SETF/NRDC Comments have been addressed sufficiently by the information contained in the original variance request and in this supplemental submission. However, should the CDPH have any additional questions arising from the SETF/NRDC Comments, Horsehead will certainly cooperate to address them.

III. CONCLUSION

Horsehead respectfully submits that it has satisfied the requirements for a variance in Section 8.0 of the Rules and requests that the Commissioner of the CDPH grant the requested variances for the reasons described above and in the Horsehead Petition for Variance.

Respectfully Submitted,

John A. Marta
Plant Manager

EXHIBIT A

Quarterly Visible Emissions and Opacity Report
Horsehead Corporation - Chicago Plant
3rd Quarter 2014 Report

QUARTERLY VISIBLE EMISSIONS AND OPACITY REPORT

Horsehead Corporation > Chicago Plant

3rd Quarter 2014 Report

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September 2014

Project 141401.0179

Trinity Consultants

Environmental solutions delivered uncommonly well

1. EXECUTIVE SUMMARY

On September 15 and 16, 2014, Trinity Consultants (Trinity) performed visible emissions observations at the Horsehead Corporation (Horsehead) Chicago Plant. These observations were conducted to comply with the City of Chicago Department of Public Health (CDPH) Rules and Regulations for Bulk Materials Storage (CDPH Bulk Storage Rules)[1], Sections 3.0(2)(d) and 3.0(3)(f)(ii) which require the facility to conduct quarterly testing to demonstrate compliance with the prohibition on fugitive dust set forth in 3.0(2)(b). The quarterly testing followed the protocol established in section 3.1.7.1 – Quarterly Visible Emissions and Opacity Testing of the Consolidated Fugitive Dust Control Plan and Operating program for Fugitive Particulate Matter for Horsehead Corporation (Chicago Plant), June 11, 2014.[2] The opacity observations were conducted in accordance with the requirements of 40 Code of Federal Regulations (CFR) 60, Appendix A, Method 9 (USEPA Method 9) and the visible emissions observations were conducted in accordance with the requirements of 40 CFR 60, Appendix A, Method 22 (USEPA Method 22).[3]

Supporting information for the report is included in the appendices. All of the visible emissions and opacity observations for the third quarter report were conducted by Mr. Jacob Beckerman of Trinity. A copy of Mr. Beckerman's current Method 9 certification is included in Appendix A.[4] A site plan of the Chicago Plant, denoting the locations of fugitive dust emissions sources, is included in Appendix B. The visible emissions and opacity observations data sheets are included in Appendix C. Meteorological data from September 15 and 16, 2014 for the Horsehead Chicago Plant is included in Appendix D which indicates that the observations were included over a range of weather conditions occurring over this period.[5] Data from Chicago Midway Airport, Lansing Municipal Airport, and Gary Chicago International Airport are included as these sites are all approximately equidistant from the Chicago Plant and representative of the weather conditions of that day.[6]

The results of the September 15 and 16, 2014 tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to CDPH Bulk Storage Rules Section 3.0(2)(a) and (b), respectively. A summary of the results is included in Section 2 of this report.

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[1] Article II. Air Pollution Control Rules and Regulations, Part B: Bulk Solid Material Facilities.
[2] While Horsehead submitted the Consolidated Fugitive Dust Control Plan and Operating Program for Fugitive Particulate Matter for Horsehead Corporation (Chicago Plant) to the City of Chicago on June 11, 2014, there has been no formal approval of such plan from the City of Chicago to Horsehead.
[3] Visible emissions and opacity observation methods used as specified in CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a).
[4] Per CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a) a professional trained and certified to read opacity in accordance with 40 CFR 60, Appendix A, Method 9 shall conduct the opacity observations.
[5] Per CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(b), observations were included over a range of weather conditions.
[6] Horsehead has not yet commenced the wind monitoring requirements per CDPH Bulk Storage Rules Section 3.0(5) per the variance request submitted to the City of Chicago dated June 13, 2014.

2. VISIBLE EMISSIONS AND OPACITY OBSERVATIONS RESULTS SUMMARY

The following table summarizes the results of all of the visible emissions and opacity observations conducted for the third quarter of 2014. As previously discussed, all observations of opacity for fugitive dust emissions sources were conducted in accordance with USEPA Method 9, and all of the property line visible emissions observations were conducted in accordance with USEPA Method 22.[7] Observation points were selected to comply with the requirement of CDPH Bulk Storage Rules Section 3.0(2)(a) to verify that there was no fugitive dust that is visible beyond the property line and with CDPH Bulk Storage Rules Section 3.0(2)(b) to verify that any bulk solid material storage pile, transfer point, roadway, or parking area does not exceed the 10% opacity limit.[8,9]

Table 2. Horsehead Corporation (Chicago Plant) 3rd Quarter 2014 Visible Emissions and Opacity Summary

Location	Type of Fugitive Emissions Source	Duration of Observation (Minutes)	Average Opacity (%)
East Coke Storage Pile	Material Storage Pile	20	0
West Coke Storage Pile	Material Storage Pile	20	0
Coke Loading Pile	Material Storage Pile	20	0
Off Spec Coke Pile	Material Storage Pile	20	0
Coke Hopper[1]	Transfer Point	6	0
IRM Storage Bunkers	Material Storage Pile	20	0
Main IRM Storage Pile	Material Storage Pile	20	0
Temporary IRM Storage Pile	Material Storage Pile	20	0
IRM Truck Loading[2]	Transfer Point	9.5	1.5
IRM Barge Loading Hopper	Transfer Point	20	0
IRM Barge Loading Conveyor/Chute	Transfer Point	20	0
Paved Road – Main Truck Road (west side of plant)	Roadway	4 vehicle passes	0
Unpaved Road – Road to IRM Truck Loading	Roadway	4 vehicle passes	0
Unpaved Road – Section of 114th St.	Roadway	4 vehicle passes	0
Property Line Locations (Method 22)[3]	Property Line	8 x 10 minutes	No visible emissions

1. Observations were taken while coke was being loaded into the hopper. The process of loading the coke only took a total of 6 minutes.
2. Observations were taken while IRM was being loaded into trucks. A total of 4 trucks were loaded, lasting a total of 9.5 minutes.
3. There were 8 property line observations conducted using EPA Method 22: North property line looking east and west, east property line looking north and south, south property line looking east and west, southwest property line looking northeast, and the west property line looking north.

[7] Visible emissions and opacity observation methods used as specified in CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a).

[8] There was no traffic movement in the parking area during the test period, the roadway test is representative of testing of a parking area.

[9] CDPH Bulk Storage Rules Section 2.0 an Internal Road is defined as, any route within a facility that is not located in an area normally used for staging or storage of material and that has evidence of repeated prior travel by, or is otherwise regularly used by vehicles for transporting materials to, from or, or within the facility. A Transfer Point is the location at or within a facility where material being moved, carried, or conveyed is dropped or deposited.

The Method 9 opacity observation results for the coke storage areas, coke pile material handling, IRM storage piles, IRM pile handling, IRM barge loading, paved roadways, and unpaved roadways were all below the 10% opacity standard promulgated in the CDPH's Bulk Storage Rules. Additionally, the Method 22 observations of visible emissions at the property boundaries showed no visible emissions crossing the plant property lines.

As discussed in the executive summary, supporting information for the report is included in the appendices. A copy of Mr. Beckerman's current Method 9 certification is included in Appendix A. A site plan of the Chicago Plant, denoting the locations of fugitive dust emissions sources, is included in Appendix B. The visible emissions and opacity observations data sheets are included in Appendix C. Meteorological data from September 15 and 16, 2014 for the Horsehead Chicago Plant is included in Appendix D.

APPENDIX A: METHOD 9 VISIBLE EMISSIONS OBSERVER CERTIFICATION

AeroMet
Engineering, Inc.
Solutions for a Changing Environment

Certification of Visible Opacity Reading

Jacob Beckerman

qualified to conduct EPA Method 9 Tests for visible opacity in accordance with the methods established for such qualification in 40 CFR Part 60 Appendix A.

Certification Date: March 25, 2014

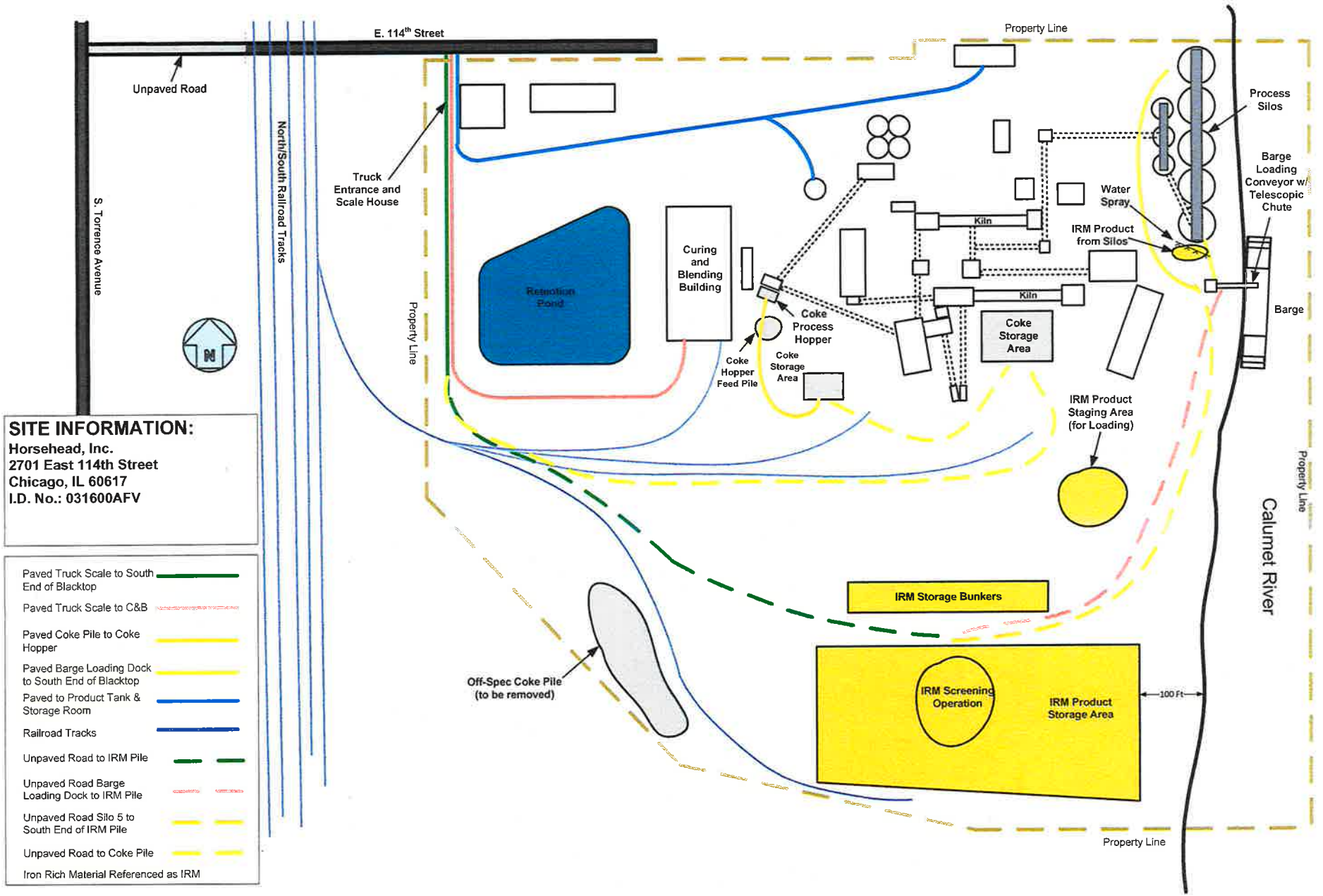
Expiration Date: September 25, 2014

AeroMet Instructor: Wayne Redden

Wayne Redden

ID 573 424 4292

APPENDIX B: FACILITY SITE DIAGRAM

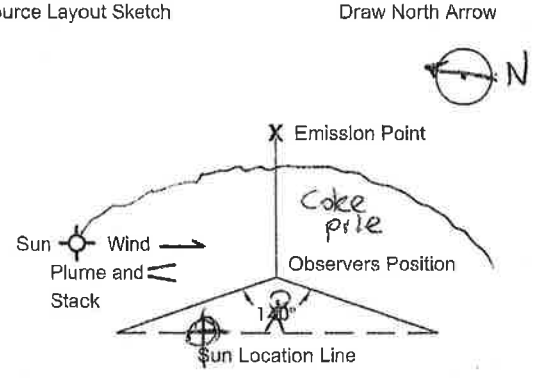

E. 114th Street
Unpaved Road
S. Torrence Avenue
North/South Railroad Tracks
Truck Entrance and Scale House
Property Line
Retention Pond
Curing and Blending Building
Kiln
Kiln
Water Spray
IRM Product from Silos
Process Silos
Barge Loading Conveyor w/ Telescopic Chute
Barge
Coke Process Hopper
Coke Hopper Feed Pile
Coke Storage Area
Coke Storage Area
IRM Product Staging Area (for Loading)
Property Line
Calumet River
IRM Storage Bunkers
Off-Spec Coke Pile (to be removed)
IRM Screening Operation
IRM Product Storage Area
100 Ft
Property Line
SITE INFORMATION:
Horsehead, Inc.
2701 East 114th Street
Chicago, IL 60617
I.D. No.: 031600AFV
Paved Truck Scale to South End of Blacktop
Paved Truck Scale to C&B
Paved Coke Pile to Coke Hopper
Paved Barge Loading Dock to South End of Blacktop
Paved to Product Tank & Storage Room
Railroad Tracks
Unpaved Road to IRM Pile
Unpaved Road Barge Loading Dock to IRM Pile
Unpaved Road Silo 5 to South End of IRM Pile
Unpaved Road to Coke Pile
Iron Rich Material Referenced as IRM

APPENDIX C: VISIBLE EMISSIONS AND OPACITY OBSERVATIONS DATA SHEETS

SOURCE NAME: Horsehead Corporation (Chicago Plant)
ADDRESS: 2701 East 114th Street
CITY: Chicago | STATE: IL | ZIP: 60617
PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV
PROCESS EQUIPMENT: East Coke Storage Pile | OPERATING MODE: N/A
CONTROL EQUIPMENT: Watering | OPERATING MODE: N/A
DESCRIBE EMISSION POINT: START Coke Storage Pile
HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15 ft
DISTANCE FROM OBSERVER: START 50 ft STOP 55 ft | DIRECTION FROM OBSERVER: START E STOP E
DESCRIBE EMISSIONS: START No Emissions STOP No Emissions
EMISSION COLOR: START N/A STOP N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☑
WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above surface STOP 4 ft above surface
DESCRIBE BACKGROUND: START Sky → overcast STOP Sky → overcast
BACKGROUND COLOR: START Grey STOP Grey | SKY CONDITIONS: START Overcast STOP Overcast
WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START From S STOP From S
AMBIENT TEMP: START 62°F STOP 59°F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch

Draw North Arrow



OBSERVATION DATE: 9/15/14 | START TIME: 1:33 pm | STOP TIME: 1:53 pm

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AVERAGE OPACITY FOR HIGHEST PERIOD: 0 %
NUMBER OF READINGS ABOVE: All 0 % WERE
RANGE OF OPACITY READINGS: 0 % MINIMUM 0 % MAXIMUM
OBSERVER'S NAME (PRINT): Jacob Beckerman
OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/15/14
ORGANIZATION: Trinity Consultants
CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14
VERIFIED BY: | DATE:

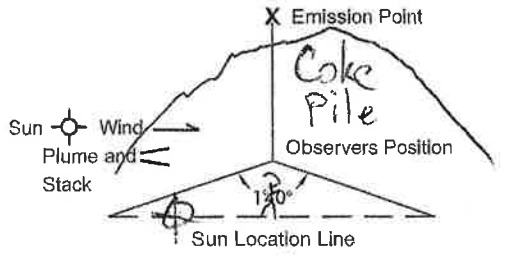
COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE | DATE

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY / STATE / ZIP	Chicago / IL / 60617
PHONE	724-773-2284
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	West Coke Pile
OPERATING MODE	N/A
CONTROL EQUIPMENT	Watering
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	West Coke storage pile
HEIGHT ABOVE GROUND LEVEL	15 ft
HEIGHT RELATIVE TO OBSERVER START / STOP	15 ft / 15 ft
DISTANCE FROM OBSERVER START / STOP	50 ft / 50 ft
DIRECTION FROM OBSERVER START / STOP	NE / NE
DESCRIBE EMISSIONS START / STOP	No emissions / No emissions
EMISSION COLOR START / STOP	N/A / N/A
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐ N/A
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START / STOP	4 ft above pile / 4 ft above pile
DESCRIBE BACKGROUND START / STOP	green tree / brown building / green tree / brown building
BACKGROUND COLOR START / STOP	green/brown / green/brown
SKY CONDITIONS START / STOP	Overcast / Overcast
WIND SPEED START / STOP	0-5 mph / 0-5 mph
WIND DIRECTION START / STOP	From SE / From SE
AMBIENT TEMP START / STOP	57°F / 57°F
WET BULB TEMP	N/A
RH, percent	N/A

Source Layout Sketch

Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
9/15/14	3:17 pm	3:37 pm

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29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD	0%
NUMBER OF READINGS ABOVE	All 0 % WERE
RANGE OF OPACITY READINGS	0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT)	Jacob Beckerman
OBSERVER'S SIGNATURE	Jacob Beckerman
DATE	9/15/14
ORGANIZATION	Trinity Consultants
CERTIFIED BY:	Aeromet Engineering Inc
DATE	3/25/14
VERIFIED BY:	
DATE	

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

TITLE / DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Coke Loading Pile | OPERATING MODE: storage / adding coke

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START Coke pile → disturbance occurring

HEIGHT ABOVE GROUND LEVEL: 10 ft | HEIGHT RELATIVE TO OBSERVER: START 10ft STOP 10ft

DISTANCE FROM OBSERVER: START 40 ft STOP 40 ft | DIRECTION FROM OBSERVER: START SW STOP SW

DESCRIBE EMISSIONS: START None STOP None

EMISSION COLOR: START N/A STOP N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above pile STOP 4ft above pile

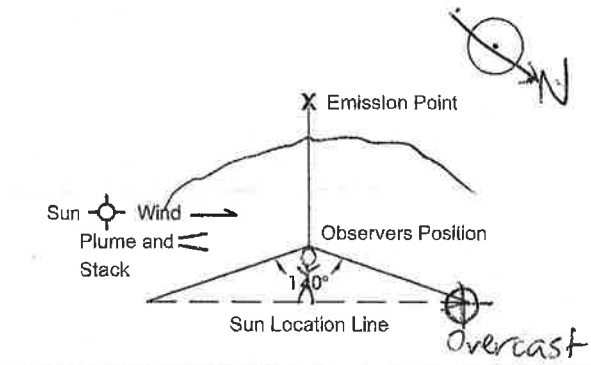
DESCRIBE BACKGROUND: START White/grey railcar STOP white/grey railcar

BACKGROUND COLOR: START White STOP White | SKY CONDITIONS: START Overcast STOP Overcast

WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START from SE STOP From SE

AMBIENT TEMP: START 57°F STOP 57°F | WET BULB TEMP: N/A | RH,percent: N/A

Source Layout Sketch



OBSERVATION DATE	START TIME	STOP TIME
9/15/14	1:59	2:19

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30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0%

NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS: Sun not 140° behind observer but overcast skies prevented Sun interference. Coke was loaded into pile during part of obs.

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/15/14

ORGANIZATION: Trinity Consultants

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

TITLE | DATE

CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14

VERIFIED BY: | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Off Spec Coke Pile | OPERATING MODE: Storing Coke

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START Coke pile → vegetation growing

HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15 ft

DISTANCE FROM OBSERVER: START 75 ft STOP 75 ft | DIRECTION FROM OBSERVER: START SW STOP SW

DESCRIBE EMISSIONS: START No emissions STOP No emissions

EMISSION COLOR: START N/A STOP N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4 ft above pile STOP 4 ft above pile

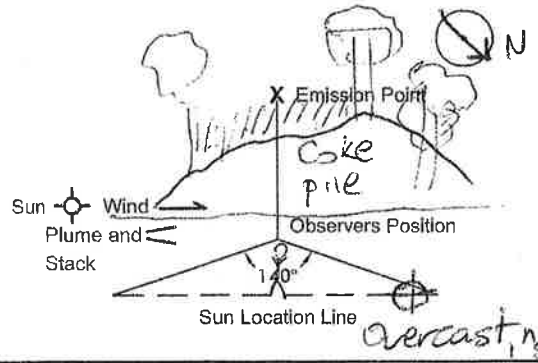
DESCRIBE BACKGROUND: START Green foliage STOP Green foliage

BACKGROUND COLOR: START Green STOP Green | SKY CONDITIONS: START Overcast STOP Overcast

WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START From S STOP From S

AMBIENT TEMP: START 57°F STOP 57°F | WET BULB TEMP: N/A | RH, percent: N/A

Source Layout Sketch — Draw North Arrow



COMMENTS:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
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TITLE: | DATE:

OBSERVATION DATE: 9/15/14 | START TIME: 3:54pm | STOP TIME: 4:14pm

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AVERAGE OPACITY FOR HIGHEST PERIOD: 0 | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/15/14

ORGANIZATION: Trinity Consultants

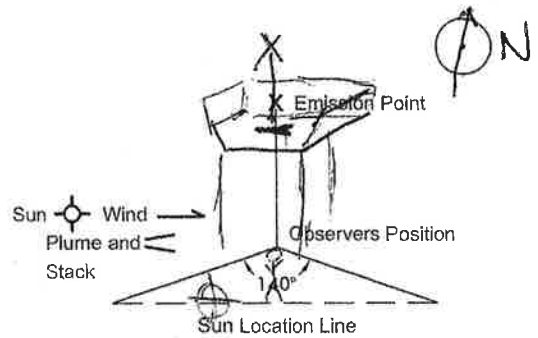
CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14

VERIFIED BY: | DATE:

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY	Chicago
STATE	IL
ZIP	60617
PHONE	724-773-2284
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	Coke Hopper
OPERATING MODE	Loading
CONTROL EQUIPMENT	N/A
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	Coke hopper → Coke being loaded into hopper
HEIGHT ABOVE GROUND LEVEL	10 ft
HEIGHT RELATIVE TO OBSERVER START	10 ft STOP 10 ft
DISTANCE FROM OBSERVER START	30 ft STOP 30 ft
DIRECTION FROM OBSERVER START	N STOP N
DESCRIBE EMISSIONS START	No emissions STOP No emissions
EMISSION COLOR START	N/A STOP N/A
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☑ YES ☐	IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	4 ft above hopper STOP 4 ft above hopper
DESCRIBE BACKGROUND START	Tan building STOP Tan building
BACKGROUND COLOR START	Tan STOP Tan
SKY CONDITIONS START	Clear STOP Clear
WIND SPEED START	0-5 mph STOP 0-5 mph
WIND DIRECTION START	From S STOP From S
AMBIENT TEMP START	62°F STOP 62°F
WET BULB TEMP	N/A
RH.percent	N/A

Source Layout Sketch

Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
9/16/14	1:43 pm	1:49 pm

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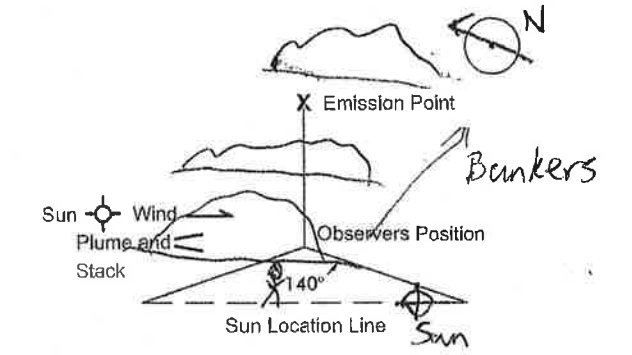
AVERAGE OPACITY FOR HIGHEST PERIOD	0%
NUMBER OF READINGS ABOVE	All 0 % WERE
RANGE OF OPACITY READINGS	0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT)	Jacob Beckerman
COMMENTS	Hopper loading takes a short amount of time. A reading was taken for the duration of the loading event
OBSERVER'S SIGNATURE	Jacob Beckerman
DATE	9/16/14
ORGANIZATION	Trinity Consultants
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE	
CERTIFIED BY:	Aeromet Engineering Inc
DATE	3/25/14
TITLE	
DATE	
VERIFIED BY:	
DATE	

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY	Chicago
STATE	IL
ZIP	60617
PHONE	724-773-2284
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	IRM Storage Bunkers
OPERATING MODE	N/A
CONTROL EQUIPMENT	N/A
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	IRM Storage Bunkers
HEIGHT ABOVE GROUND LEVEL	8 ft
HEIGHT RELATIVE TO OBSERVER START	8ft STOP 8ft
DISTANCE FROM OBSERVER START	20ft STOP 20 ft
DIRECTION FROM OBSERVER START	NE STOP NE
DESCRIBE EMISSIONS START	No emissions STOP No emissions
EMISSION COLOR START	N/A STOP N/A
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☑ YES ☐	
IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	4ft above surface STOP 4 ft above surface
DESCRIBE BACKGROUND START	Blue sky STOP Blue Sky
BACKGROUND COLOR START	Blue STOP Blue
SKY CONDITIONS START	Clear STOP Clear
WIND SPEED START	5-10mph STOP 5-10mph
WIND DIRECTION START	From E STOP From E
AMBIENT TEMP START	62°F STOP 62°F
WET BULB TEMP	N/A
RH, percent	N/A

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	9/16/14			START TIME	2:03 pm		STOP TIME	2:23 pm		
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30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE	All 0 % WERE
RANGE OF OPACITY READINGS	0 % MINIMUM 0 % MAXIMUM
OBSERVER'S NAME (PRINT)	Jacob Beckerman
OBSERVER'S SIGNATURE	Jacob Beckerman
DATE	9/16/14
ORGANIZATION	Trinity Consultants
CERTIFIED BY:	Aeromet Engineering Inc
DATE	3/25/14
VERIFIED BY:	
DATE	
COMMENTS	
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE	
TITLE	
DATE	

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Main IRM Storage Pile | OPERATING MODE: N/A

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START IRM storage pile

HEIGHT ABOVE GROUND LEVEL: 30 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15 ft

DISTANCE FROM OBSERVER: START 100 ft STOP 100 ft | DIRECTION FROM OBSERVER: START SW STOP SW

DESCRIBE EMISSIONS: START No emissions STOP No emissions

EMISSION COLOR: START N/A STOP N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above surface STOP 4ft above surface

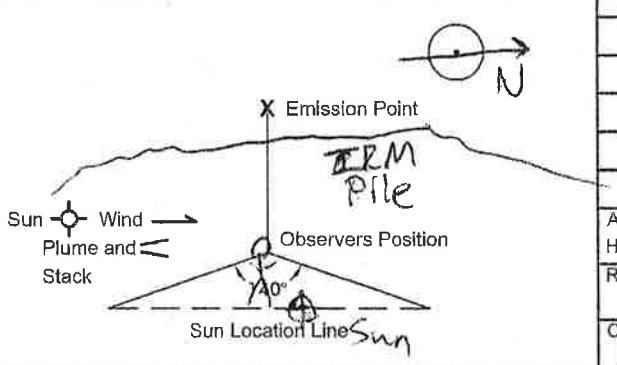
DESCRIBE BACKGROUND: START Sky/Green Trees STOP sky/green trees

BACKGROUND COLOR: START Blue/Green STOP Blue/green | SKY CONDITIONS: START Clear STOP Clear

WIND SPEED: START 0-5 STOP 0-5 | WIND DIRECTION: START From N STOP From N

AMBIENT TEMP: START 62°F STOP 62°F | WET BULB TEMP: N/A | RH,percent: N/A

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE: 9/16/14 | START TIME: 11:48 am | STOP TIME: 12:08 pm

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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5	0	0	0	0	35				
6	0	0	0	0	36				
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29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM | 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/16/14

ORGANIZATION: Trinity Consultants

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SIGNATURE

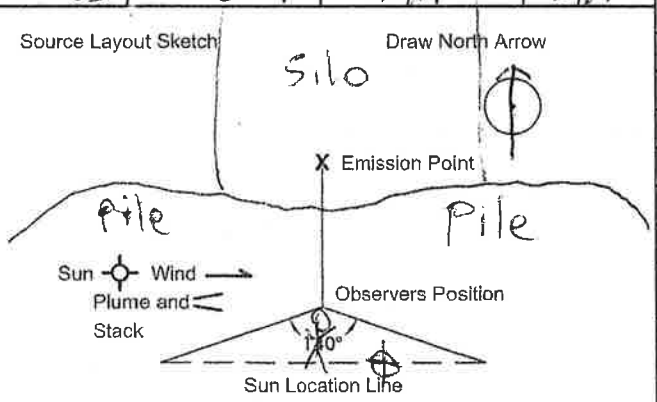
CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14

TITLE | DATE

VERIFIED BY: | DATE

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY	Chicago
STATE	IL
ZIP	60617
PHONE	724-773-2284
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	Temporary IRM Pile
OPERATING MODE	N/A
CONTROL EQUIPMENT	Watering
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	Temporary IRM storage pile
HEIGHT ABOVE GROUND LEVEL	15 ft
HEIGHT RELATIVE TO OBSERVER START / STOP	15 ft / 15 ft
DISTANCE FROM OBSERVER START / STOP	50 ft / 50 ft
DIRECTION FROM OBSERVER START / STOP	N / N
DESCRIBE EMISSIONS START / STOP	No emissions / No emissions
EMISSION COLOR START / STOP	N/A / N/A
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☑ YES ☐
IF WATER DROPLET PLUME	ATTACHED ☐ DETACHED ☐ N/A
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START / STOP	4ft above surface / 4ft above surface
DESCRIBE BACKGROUND START / STOP	Sky / tan silo / Sky / tan silo
BACKGROUND COLOR START / STOP	Blue/Tan / Blue/Tan
SKY CONDITIONS START / STOP	Clear / Clear
WIND SPEED START / STOP	5-10 mph / 0-5 mph
WIND DIRECTION START / STOP	From N / From E
AMBIENT TEMP START / STOP	62°F / 62°F
WET BULB TEMP	N/A
RH.percent	N/A

Source Layout Sketch



SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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28					58				
29					59				
30					60				

OBSERVATION DATE	9/16/14
START TIME	1:08 pm
STOP TIME	1:28 pm
AVERAGE OPACITY FOR HIGHEST PERIOD	0%
NUMBER OF READINGS ABOVE	All 0 % WERE
RANGE OF OPACITY READINGS	0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT)	Jacob Beckerman
OBSERVER'S SIGNATURE	Jacob Beckerman
DATE	9/16/14
ORGANIZATION	Trinity Consultants
CERTIFIED BY:	Aeromet Engineering Inc
DATE	3/25/14
COMMENTS	
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS SIGNATURE	
TITLE	
DATE	
VERIFIED BY:	
DATE	

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: IRM Truck Loading | OPERATING MODE: Loading

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START Loading IRM into trucks → observe above truck

HEIGHT ABOVE GROUND LEVEL: 10 ft | HEIGHT RELATIVE TO OBSERVER: START 12 ft STOP 12 ft

DISTANCE FROM OBSERVER: START 40 ft STOP 40 ft | DIRECTION FROM OBSERVER: START SW STOP SW

DESCRIBE EMISSIONS: START Black plume of dust STOP Black plume of dust

EMISSION COLOR: START Black STOP Black | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☑ see note | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 2 ft above truck STOP 2 ft above truck

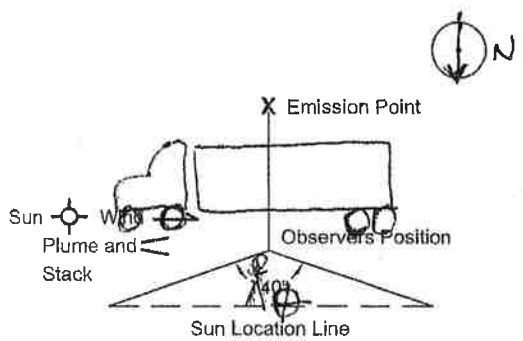
DESCRIBE BACKGROUND: START Blue Sky STOP Blue Sky

BACKGROUND COLOR: START Blue STOP Blue | SKY CONDITIONS: START Clear STOP Clear

WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START From NW STOP From NW

AMBIENT TEMP: START 52 °F STOP 52 °F | WET BULB TEMP: N/A | RH, percent: N/A

Source Layout Sketch



OBSERVATION DATE: 9/16/14 | START TIME: 8:23 am | STOP TIME: 8:33 am

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	5	0	31				
2	0	5	0	0	32				
3	0	5	0	0	33				
4	0	5	0	0	34				
5	5	0	0	0	35				
6	5	0	0	0	36				
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10	0	0			40				
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12					42				
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29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 1.5% | NUMBER OF READINGS ABOVE: 10 % WERE 0

RANGE OF OPACITY READINGS: 0% MINIMUM 5% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS: 4 trucks loaded with IRM. Steam escapes IRM when loaded into trucks.

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/16/14

ORGANIZATION: Trinity Consultants

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SIGNATURE

TITLE | DATE

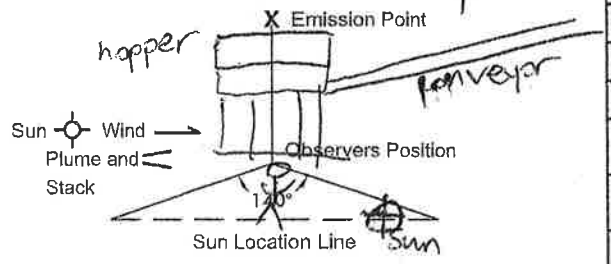
CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14

VERIFIED BY: | DATE

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY	Chicago
STATE	IL
ZIP	60617
PHONE	724-773-2284
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	Barge Loading Hopper
OPERATING MODE	Loading
CONTROL EQUIPMENT	None
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	Loading of IRM into barge
HEIGHT ABOVE GROUND LEVEL	15 ft
HEIGHT RELATIVE TO OBSERVER START	15 ft
HEIGHT RELATIVE TO OBSERVER STOP	15 ft
DISTANCE FROM OBSERVER START	50 ft
DISTANCE FROM OBSERVER STOP	50 ft
DIRECTION FROM OBSERVER START	N
DIRECTION FROM OBSERVER STOP	N
DESCRIBE EMISSIONS START	Black dust expected
DESCRIBE EMISSIONS STOP	No emissions observed
EMISSION COLOR START	None
EMISSION COLOR STOP	None
PLUME TYPE	CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐
WATER DROPLETS PRESENT	NO ☐ YES ☑ see comment
IF WATER DROPLET PLUME	N/A ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	2 ft above hopper
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED STOP	2 ft above hopper
DESCRIBE BACKGROUND START	Tan silo
DESCRIBE BACKGROUND STOP	Tan silo
BACKGROUND COLOR START	Tan
BACKGROUND COLOR STOP	Tan
SKY CONDITIONS START	Clear
SKY CONDITIONS STOP	Clear
WIND SPEED START	0-5 mph
WIND SPEED STOP	0-5 mph
WIND DIRECTION START	From E
WIND DIRECTION STOP	From E
AMBIENT TEMP START	60°F
AMBIENT TEMP STOP	60°F
WET BULB TEMP	N/A
RH.percent	N/A

Source Layout Sketch

Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
9/16/14	10:00 am	10:20 am

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
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27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD	0%
NUMBER OF READINGS ABOVE	All 0 % WERE
RANGE OF OPACITY READINGS	0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT)	Jacob Beckerman
COMMENTS	IRM is watered to prevent dust, but steam is present when dumping
OBSERVER'S SIGNATURE	Jacob Beckerman
DATE	9/16/14
ORGANIZATION	Trinity Consultants
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CERTIFIED BY:	Aerosmet Engineering Inc
DATE	3/25/14
TITLE	
DATE	
VERIFIED BY:	
DATE	

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 724-773-2284 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: IRM Barge Conveyor Chute | OPERATING MODE: Normal/loading

CONTROL EQUIPMENT: Covered conveyor and chute | OPERATING MODE: N/A

DESCRIBE EMISSION POINT
START: Chute into barge

HEIGHT ABOVE GROUND LEVEL: 3 ft | HEIGHT RELATIVE TO OBSERVER START: 0 ft STOP: 0 ft

DISTANCE FROM OBSERVER START: 30 ft STOP: 30 ft | DIRECTION FROM OBSERVER START: NE STOP: NE

DESCRIBE EMISSIONS
START: Black dust expected STOP: No emissions

EMISSION COLOR START: N/A STOP: N/A | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES ☑ see comment | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
START: 2 ft above IRM pile STOP: 2 ft above IRM pile

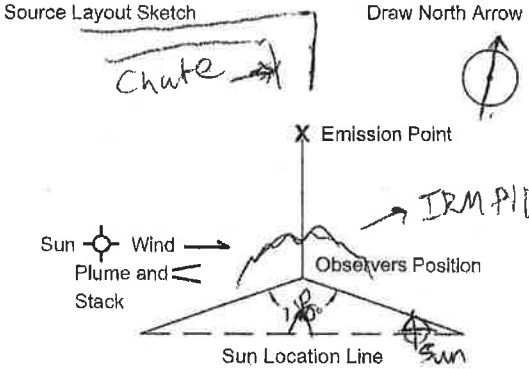
DESCRIBE BACKGROUND
START: Grey barge STOP: Grey barge

BACKGROUND COLOR START: grey barge STOP: grey barge | SKY CONDITIONS START: Clear STOP: Clear

WIND SPEED START: 0-5 mph STOP: 0-5 mph | WIND DIRECTION START: from SE STOP: from S

AMBIENT TEMP START: 60°F STOP: 60°F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



COMMENTS: IRM observed at drop pt in barge above pile and at conveyor chute
IRM is watered, steam is present when dumping IRM into barge

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SIGNATURE | TITLE | DATE

OBSERVATION DATE: 9/16/14 | START TIME: 10:41 am | STOP TIME: 11:11 am

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36	10:48 stop			
7	0	0	0	0	37	Break			
8	0	0	0	0	38	10:57 start			
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
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18	0	0	0	0	48				
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25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 9/16/14

ORGANIZATION: Trinity Consultants

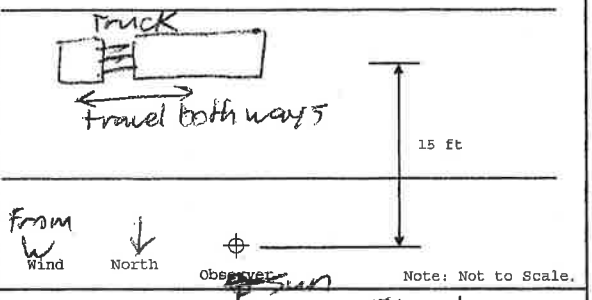
CERTIFIED BY: Aeromet Engineering Inc | DATE: 3/25/14

VERIFIED BY: | DATE

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: Horsehead Corporation	Provide sketch of observer's position relative to the source:
Address: 2701 E. 114th St Chicago, IL 60617	
Facility ID: 031600AFV	
Date: 9/16/14	
Location Description: Paved road in plant	
Control Device: Wetting	
Hours of Observation: ~~1~~ 1 hr	
Observer's Name: Jacob Beckerman	
Certification Date of Observer: 3/25/14	Observer's Affiliation: Trinity
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	9:00 am	Final	9:08
OBSERVER LOCATION				
Distance to discharge	**15 ft**		**15 ft**	
Direction from discharge	**90 degrees**		**90 degrees**	
Height of observation point	**4 ft**		**4 ft**	
BACKGROUND DESCRIPTION	Green Foliage		Green Foliage	
WEATHER CONDITIONS				
Wind Direction	**From the** West		**From the** West	
Wind Speed	0-5 **mph**		0-5 **mph**	
Ambient Temperature	60 **F**		60 **F**	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	Clear		Clear	
PLUME DESCRIPTION				
Color	No dust		No dust	
Distance Visible	No emissions **miles**		No emissions **miles**	
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity (%)	
	Start - End	Sum	Average
1	9:01:00 - 9:01:15	0	0
2	9:03:00 - 9:03:15	0	0
3	9:05:15 - 9:05:30	0	0
4	9:07:45 - 9:08:00	0	0

Readings ranged from 0 to 0 % opacity.

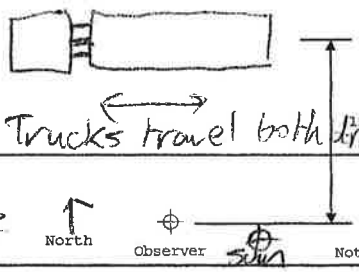
Average of 12 readings: 0

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: Horsehead Corporation	Provide sketch of observer's position relative to the source:
Address: 2701 E. 114th St Chicago, IL 60617	
Facility ID: 031600AFV	
Date: 9/16/14	
Location Description: Unpaved Road to IRM	
Control Device: Wetting	
Hours of Observation: < 1 hr	
Observer's Name: Jacob Beckerman	
Certification Date of Observer: 3/25/14	Observer's Affiliation: Trinity
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	8:44 am	Final	8:46 am
OBSERVER LOCATION				
Distance to discharge	15 ft		15 ft	
Direction from discharge	90 degrees		90 degrees	
Height of observation point	4 ft		4 ft	
BACKGROUND DESCRIPTION	Green foliage		Green foliage	
WEATHER CONDITIONS				
Wind Direction	N/A From the		N/A From the	
Wind Speed	0 mph		0 mph	
Ambient Temperature	52 F		52 F	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	Clear		Clear	
PLUME DESCRIPTION				
Color	Grey dust		Grey dust	
Distance Visible	> 1 miles		> 1 miles	
OTHER INFORMATION	4 IRM truck passes			

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity (%)	
	Start - End	Sum	Average
1	8:44:00 - 8:44:15	0	0
2	8:44:45 - 8:45:00	0	0
3	8:45:30 - 8:45:45	0	0
4	8:46:20 - 8:45:35	0	0

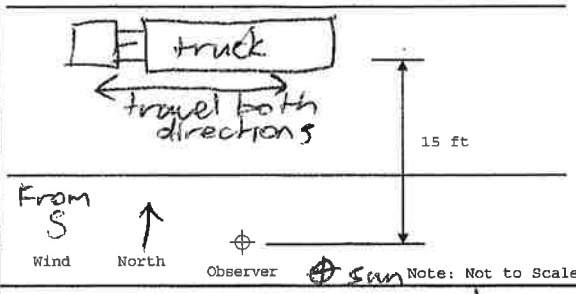
Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: Horsehead Corporation	Provide sketch of observer's position relative to the source:
Address: 2701 E. 114th St Chicago, IL 60617	
Facility ID: 031600AFV	
Date: 9/16/14	
Location Description: Unpaved portion of 114th St	
Control Device: Watting	
Hours of Observation: 2/hr	
Observer's Name: Jacob Beckerman	
Certification Date of Observer: 3/25/14	Observer's Affiliation: Trinity
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	9:18 am	Final	9:22 am
OBSERVER LOCATION				
Distance to discharge	**15 ft**		**15 ft**	
Direction from discharge	**90 degrees**		**90 degrees**	
Height of observation point	**4 ft**		**4 ft**	
BACKGROUND DESCRIPTION	Green Foliage		Green Foliage	
WEATHER CONDITIONS				
Wind Direction	**From the South**		**From the South**	
Wind Speed	0-5 **mph**		0-5 **mph**	
Ambient Temperature	60 **F**		60 **F**	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	Clear		Clear	
PLUME DESCRIPTION				
Color	No emissions		No emissions	
Distance Visible	No emissions **miles**		No emissions **miles**	
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity (%)	
	Start - End	Sum	Average
1	9:18:00 - 9:18:15	0	0
2	9:19:00 - 9:19:15	0	0
3	9:21:00 - 9:21:15	0	0
4	9:22:00 - 9:22:15	0	0

Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0

40 CFR 60, App. A, Method 9

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/14
Sky Conditions Blue/Clear	**Wind Direction** From NE
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** North property boundary looking west

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS

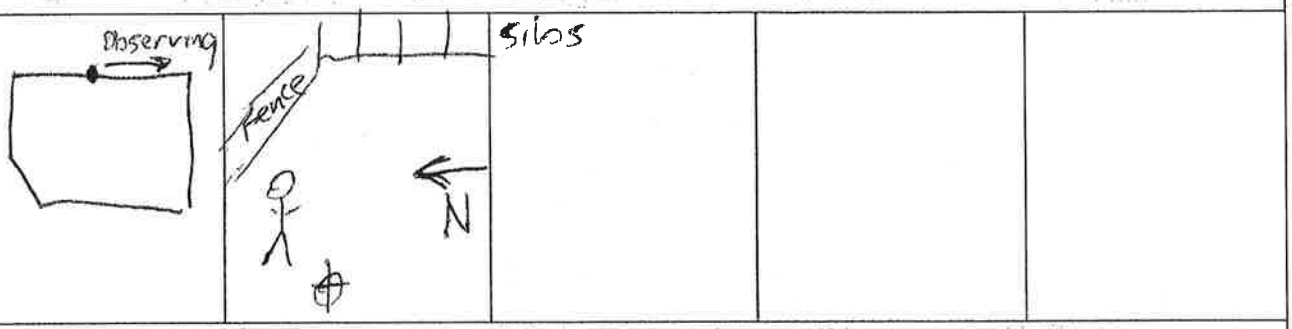
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	3:48 pm		
End Observation	3:58 pm	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Candrick	**Date** 9/16/14
Sky Conditions Clear / Blue	**Wind Direction** From N
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** North property boundary (looking east)

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

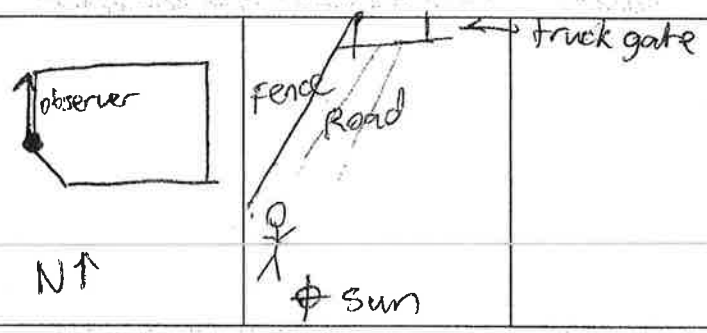
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	3:33 pm		
End Observation	3:43 pm	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0 %

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/14
Sky Conditions Blue / Clear	**Wind Direction** From NE
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 5-10 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** West property boundary

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

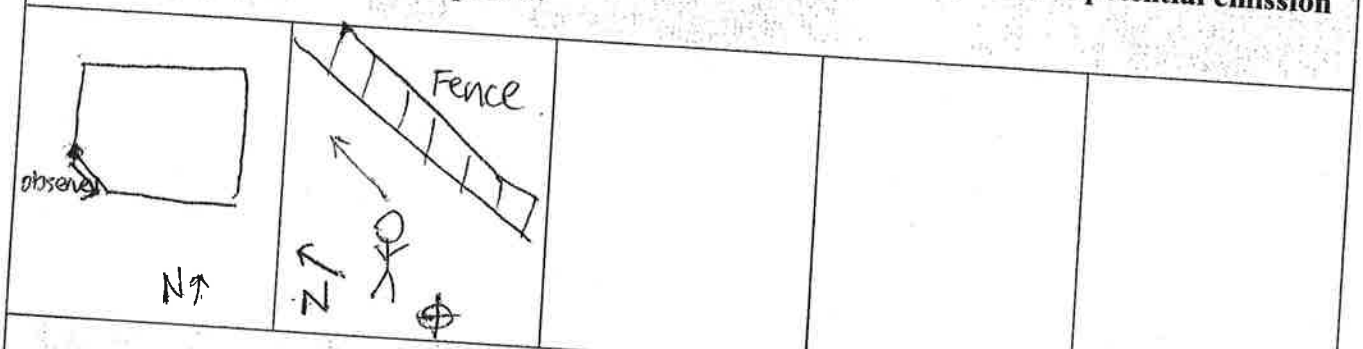
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	3:12 pm		
End Observation	3:22 pm	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/14
Sky Conditions Blue/Clear	**Wind Direction** From NW
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** SW property boundary

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

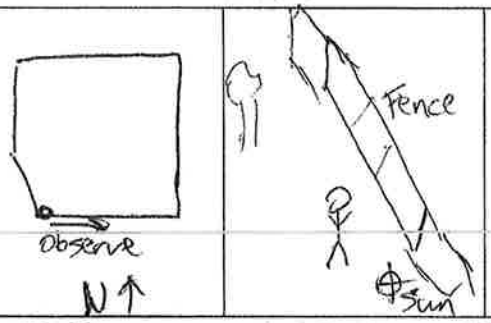
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	2:54 pm		
End Observation	3:04 pm	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Cendrick	**Date** 9/16/14
Sky Conditions Blue/Clear	**Wind Direction** From N
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** South property line looking east

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

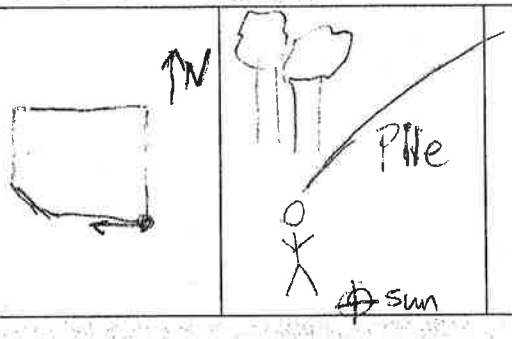
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	2:34 pm		
End Observation	2:44 pm	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/14
Sky Conditions Blue Clear	**Wind Direction** From S
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** South Property Border looking west

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

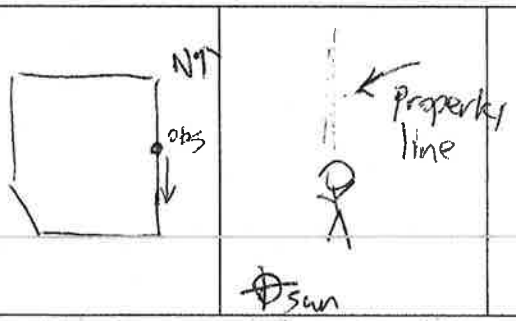
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	7:51		
End Observation	8:01		00:00

Total Sample Time:	10:00
Total Emission Time:	0:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/14
Sky Conditions Blue / Clear	**Wind Direction** No wind
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** East property boundary looking south

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

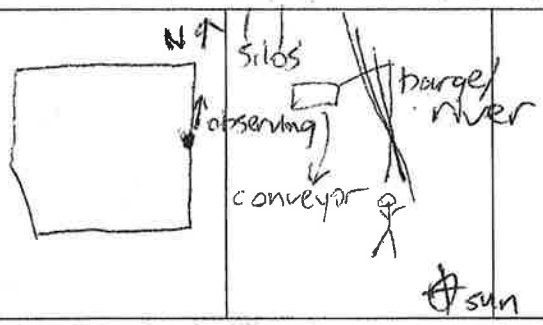
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	8:11 am		
End Observation	8:21 am	10:00:00	00:00

Total Sample Time:	10:00
Total Emission Time:	0:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** Jacob Beckerman
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** Trinity Consultants
Company Rep. Frank Condrick	**Date** 9/16/15
Sky Conditions Blue/Clear	**Wind Direction** From E
Precipitation 0.02 in. last 48 hrs	**Wind Speed** 0-5 mph
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** East plant boundry looking north

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	11:21 am		
End Observation	11:31 am	10:00	00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

APPENDIX D: METEOROLOGICAL DATA

Horsehead Corporation - Chicago Plant

September 15, 2014 Meteorological Data from Lansing Municipal Airport - KIGQ

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:15 AM	50.0 °F	48.2 °F	94%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
12:35 AM	49.5 °F	47.1 °F	92%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
12:55 AM	49.1 °F	46.8 °F	92%	30.20 in	10.0 mi	Calm	Calm	-	N/A		Clear
1:15 AM	46.6 °F	45.3 °F	95%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
1:35 AM	47.5 °F	45.1 °F	92%	30.20 in	10.0 mi	Calm	Calm	-	N/A		Clear
1:55 AM	47.8 °F	45.3 °F	91%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
2:15 AM	48.4 °F	47.1 °F	95%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
2:35 AM	48.9 °F	46.4 °F	91%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
2:55 AM	49.1 °F	46.2 °F	90%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
3:15 AM	48.9 °F	46.9 °F	93%	30.18 in	10.0 mi	Calm	Calm	-	N/A		Clear
3:35 AM	49.1 °F	47.3 °F	93%	30.18 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
3:55 AM	48.6 °F	46.4 °F	92%	30.17 in	10.0 mi	SE	3.5 mph	-	N/A		Scattered Clouds
4:15 AM	48.2 °F	45.9 °F	92%	30.17 in	10.0 mi	Calm	Calm	-	N/A		Clear
4:35 AM	48.9 °F	46.6 °F	92%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
4:55 AM	49.3 °F	47.3 °F	93%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Overcast
5:15 AM	50.4 °F	47.8 °F	91%	30.17 in	10.0 mi	SW	4.6 mph	-	N/A		Overcast
5:35 AM	50.2 °F	48.4 °F	94%	30.17 in	10.0 mi	Calm	Calm	-	0.02 in		Overcast
5:55 AM	50.9 °F	48.2 °F	90%	30.16 in	10.0 mi	South	4.6 mph	-	0.02 in	Thunderstorm	Overcast
6:15 AM	51.1 °F	48.4 °F	90%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:35 AM	51.4 °F	49.1 °F	92%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:55 AM	52.3 °F	48.2 °F	86%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:15 AM	52.0 °F	48.6 °F	88%	30.16 in	10.0 mi	South	4.6 mph	-	N/A		Overcast
7:35 AM	52.2 °F	48.6 °F	88%	30.18 in	10.0 mi	SW	3.5 mph	-	N/A	Thunderstorm	Overcast
7:55 AM	52.3 °F	48.7 °F	88%	30.18 in	10.0 mi	Calm	Calm	-	N/A	Rain	Heavy Rain
8:15 AM	51.8 °F	49.5 °F	92%	30.14 in	10.0 mi	SE	6.9 mph	-	N/A	Rain	Light Rain
8:35 AM	52.0 °F	49.6 °F	92%	30.14 in	10.0 mi	SSE	4.6 mph	-	N/A	Rain	Light Rain
8:55 AM	53.2 °F	50.9 °F	92%	30.17 in	10.0 mi	North	5.8 mph	-	N/A		Mostly Cloudy
9:15 AM	54.5 °F	50.7 °F	87%	30.14 in	10.0 mi	SSE	3.5 mph	-	N/A	Thunderstorm	Mostly Cloudy
9:35 AM	55.8 °F	51.8 °F	87%	30.13 in	10.0 mi	SSW	4.6 mph	-	N/A		Mostly Cloudy
9:55 AM	57.2 °F	51.8 °F	82%	30.14 in	10.0 mi	SW	4.6 mph	-	N/A		Overcast
10:15 AM	57.2 °F	51.8 °F	82%	30.15 in	10.0 mi	SW	4.6 mph	-	N/A		Overcast
10:35 AM	57.7 °F	53.1 °F	84%	30.15 in	10.0 mi	North	6.9 mph	-	N/A		Overcast
10:55 AM	57.4 °F	51.8 °F	82%	30.15 in	10.0 mi	SW	8.1 mph	-	N/A		Overcast
11:15 AM	57.2 °F	52.7 °F	85%	30.15 in	10.0 mi	South	6.9 mph	-	N/A		Overcast
11:35 AM	57.0 °F	52.5 °F	85%	30.15 in	10.0 mi	South	5.8 mph	-	N/A		Overcast
11:55 AM	57.6 °F	52.7 °F	84%	30.14 in	10.0 mi	South	8.1 mph	-	N/A		Overcast
12:15 PM	57.4 °F	51.8 °F	82%	30.13 in	10.0 mi	SSW	6.9 mph	-	N/A		Overcast
12:35 PM	57.2 °F	51.8 °F	82%	30.13 in	10.0 mi	SW	8.1 mph	-	N/A		Overcast
12:55 PM	57.2 °F	52.0 °F	83%	30.13 in	10.0 mi	WSW	6.9 mph	-	N/A		Overcast
1:15 PM	57.7 °F	51.4 °F	79%	30.12 in	10.0 mi	SSW	8.1 mph	-	N/A		Overcast
1:35 PM	58.1 °F	52.0 °F	80%	30.11 in	10.0 mi	SW	8.1 mph	-	N/A		Overcast
1:55 PM	56.5 °F	52.3 °F	86%	30.10 in	10.0 mi	SSW	9.2 mph	-	N/A	Rain	Light Rain
2:15 PM	55.6 °F	52.0 °F	88%	30.11 in	10.0 mi	SSW	5.8 mph	-	N/A	Rain	Light Rain
2:35 PM	55.6 °F	53.2 °F	92%	30.10 in	10.0 mi	SSW	6.9 mph	-	N/A	Rain	Light Rain
2:55 PM	55.6 °F	53.4 °F	92%	30.09 in	10.0 mi	SSW	5.8 mph	-	N/A		Overcast
3:15 PM	55.6 °F	53.2 °F	92%	30.09 in	10.0 mi	SW	3.5 mph	-	N/A		Overcast
3:35 PM	55.6 °F	53.4 °F	92%	30.09 in	7.0 mi	Calm	Calm	-	N/A	Rain	Rain
3:55 PM	55.8 °F	53.6 °F	92%	30.09 in	10.0 mi	Calm	Calm	-	N/A		Overcast
4:15 PM	55.8 °F	53.6 °F	92%	30.09 in	10.0 mi	Calm	Calm	-	N/A		Overcast
4:35 PM	55.8 °F	52.5 °F	89%	30.09 in	10.0 mi	Calm	Calm	-	N/A		Overcast
4:55 PM	55.8 °F	53.4 °F	92%	30.09 in	5.0 mi	Calm	Calm	-	N/A		Heavy Drizzle
5:15 PM	55.2 °F	53.4 °F	94%	30.10 in	3.0 mi	North	3.5 mph	-	N/A	Rain	Rain
5:35 PM	54.5 °F	53.4 °F	96%	30.11 in	4.0 mi	North	5.8 mph	-	N/A	Rain	Rain
5:55 PM	54.5 °F	53.6 °F	97%	30.12 in	4.0 mi	Calm	Calm	-	N/A	Rain	Rain
6:15 PM	54.3 °F	53.1 °F	95%	30.12 in	7.0 mi	Calm	Calm	-	N/A	Rain	Light Rain
6:35 PM	54.7 °F	53.6 °F	96%	30.12 in	10.0 mi	Calm	Calm	-	N/A		Overcast
6:55 PM	54.5 °F	53.2 °F	96%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:15 PM	54.5 °F	53.4 °F	96%	30.12 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:35 PM	54.5 °F	53.6 °F	97%	30.12 in	10.0 mi	Calm	Calm	-	N/A		Overcast
7:55 PM	54.7 °F	53.6 °F	96%	30.12 in	5.0 mi	West	4.6 mph	-	N/A		Overcast
8:15 PM	54.7 °F	53.8 °F	97%	30.12 in	5.0 mi	West	3.5 mph	-	N/A		Overcast
8:35 PM	54.9 °F	54.0 °F	97%	30.13 in	5.0 mi	NW	4.6 mph	-	N/A		Overcast
8:55 PM	54.9 °F	54.1 °F	97%	30.13 in	5.0 mi	Calm	Calm	-	N/A		Overcast
9:15 PM	55.0 °F	54.5 °F	98%	30.14 in	5.0 mi	Calm	Calm	-	N/A		Overcast
9:35 PM	55.4 °F	54.5 °F	97%	30.14 in	7.0 mi	Calm	Calm	-	N/A		Overcast
9:55 PM	55.6 °F	54.7 °F	97%	30.14 in	7.0 mi	NNW	3.5 mph	-	N/A		Overcast
10:15 PM	56.3 °F	54.5 °F	94%	30.15 in	10.0 mi	NNW	5.8 mph	-	N/A		Overcast
10:35 PM	56.5 °F	54.5 °F	93%	30.15 in	10.0 mi	NNW	4.6 mph	-	N/A		Overcast
10:55 PM	56.5 °F	54.5 °F	93%	30.16 in	10.0 mi	North	5.8 mph	-	N/A		Overcast
11:15 PM	56.3 °F	53.2 °F	89%	30.16 in	10.0 mi	North	9.2 mph	-	N/A		Overcast
11:35 PM	55.9 °F	52.7 °F	89%	30.16 in	10.0 mi	North	5.8 mph	-	N/A		Overcast
11:55 PM	54.9 °F	52.0 °F	90%	30.16 in	10.0 mi	North	5.8 mph	-	N/A		Overcast

*Meteorological data was obtained from the National Weather Service via the weatherunderground.com website

Horsehead Corporation - Chicago Plant

September 16, 2014 Meteorological Data from Lansing Municipal Airport - KIGQ

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:15 AM	54.0 °F	51.3 °F	91%	30.16 in	10.0 mi	NNW	4.6 mph	-	N/A		Mostly Cloudy
12:35 AM	52.7 °F	50.0 °F	91%	30.17 in	10.0 mi	NNW	4.6 mph	-	N/A		Scattered Clouds
12:55 AM	52.0 °F	49.5 °F	91%	30.17 in	10.0 mi	NNW	4.6 mph	-	N/A		Clear
1:15 AM	51.4 °F	49.1 °F	92%	30.17 in	10.0 mi	NNW	4.6 mph	-	N/A		Clear
1:35 AM	50.9 °F	48.4 °F	91%	30.17 in	10.0 mi	NNW	5.8 mph	-	N/A		Clear
1:55 AM	50.0 °F	47.8 °F	92%	30.18 in	10.0 mi	WNW	3.5 mph	-	N/A		Clear
2:15 AM	49.3 °F	47.3 °F	93%	30.18 in	10.0 mi	West	3.5 mph	-	N/A		Clear
2:35 AM	48.4 °F	46.9 °F	95%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
2:55 AM	48.4 °F	47.3 °F	96%	30.19 in	10.0 mi	WNW	3.5 mph	-	N/A		Clear
3:15 AM	48.6 °F	47.7 °F	97%	30.19 in	10.0 mi	WNW	3.5 mph	-	N/A		Scattered Clouds
3:35 AM	48.2 °F	47.3 °F	97%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
3:55 AM	47.8 °F	46.9 °F	97%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
4:15 AM	48.9 °F	48.0 °F	97%	30.19 in	10.0 mi	NW	4.6 mph	-	N/A		Overcast
4:35 AM	50.0 °F	48.6 °F	95%	30.18 in	10.0 mi	NNW	6.9 mph	-	N/A		Overcast
4:55 AM	49.5 °F	47.7 °F	94%	30.19 in	10.0 mi	NNW	3.5 mph	-	N/A		Mostly Cloudy
5:15 AM	48.7 °F	47.3 °F	95%	30.19 in	10.0 mi	NW	4.6 mph	-	N/A		Scattered Clouds
5:35 AM	48.4 °F	46.8 °F	94%	30.19 in	10.0 mi	WNW	3.5 mph	-	N/A		Clear
5:55 AM	47.8 °F	46.6 °F	95%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Clear
6:15 AM	46.8 °F	45.3 °F	95%	30.20 in	10.0 mi	Calm	Calm	-	N/A		Clear
6:35 AM	45.9 °F	45.1 °F	97%	30.19 in	7.0 mi	Calm	Calm	-	N/A		Clear
6:55 AM	46.6 °F	45.9 °F	97%	30.20 in	10.0 mi	WNW	3.5 mph	-	N/A		Clear
7:15 AM	47.3 °F	46.4 °F	97%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Clear
7:35 AM	48.9 °F	47.3 °F	94%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Clear
7:55 AM	50.2 °F	47.8 °F	92%	30.21 in	10.0 mi	WNW	3.5 mph	-	N/A		Clear
8:15 AM	51.4 °F	48.2 °F	89%	30.21 in	10.0 mi	NNW	3.5 mph	-	N/A		Clear
8:35 AM	52.9 °F	48.7 °F	86%	30.21 in	10.0 mi	NW	3.5 mph	-	N/A		Clear
8:55 AM	54.5 °F	49.8 °F	84%	30.21 in	10.0 mi	NW	4.6 mph	-	N/A		Clear
9:15 AM	56.1 °F	49.8 °F	79%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:35 AM	57.0 °F	49.6 °F	76%	30.22 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:55 AM	58.1 °F	47.7 °F	68%	30.22 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:15 AM	60.3 °F	48.2 °F	64%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:35 AM	60.3 °F	46.8 °F	61%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:55 AM	61.3 °F	46.6 °F	58%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
11:15 AM	60.8 °F	43.5 °F	53%	30.20 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
11:35 AM	61.7 °F	45.7 °F	56%	30.19 in	10.0 mi	North	3.5 mph	-	N/A		Mostly Cloudy
11:55 AM	62.2 °F	44.1 °F	51%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
12:15 PM	62.8 °F	43.3 °F	49%	30.19 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
12:35 PM	64.4 °F	46.2 °F	52%	30.18 in	10.0 mi	NW	6.9 mph	-	N/A		Scattered Clouds
12:55 PM	64.4 °F	46.0 °F	51%	30.18 in	10.0 mi	WSW	3.5 mph	-	N/A		Clear
1:15 PM	64.6 °F	44.6 °F	48%	30.17 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
1:35 PM	64.8 °F	45.0 °F	49%	30.17 in	10.0 mi	NW	3.5 mph	-	N/A		Mostly Cloudy
1:55 PM	64.0 °F	43.7 °F	48%	30.16 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
2:15 PM	64.6 °F	43.9 °F	47%	30.15 in	10.0 mi	ENE	4.6 mph	-	N/A		Clear
2:35 PM	63.3 °F	43.2 °F	48%	30.14 in	10.0 mi	WNW	4.6 mph	-	N/A		Clear
2:55 PM	66.2 °F	44.6 °F	46%	30.13 in	10.0 mi	West	5.8 mph	-	N/A		Clear
3:15 PM	65.7 °F	45.1 °F	47%	30.13 in	10.0 mi	West	5.8 mph	-	N/A		Scattered Clouds
3:35 PM	65.7 °F	44.1 °F	46%	30.13 in	10.0 mi	West	4.6 mph	-	N/A		Clear
3:55 PM	65.8 °F	43.7 °F	45%	30.12 in	10.0 mi	Calm	Calm	-	N/A		Clear
4:15 PM	65.8 °F	44.2 °F	46%	30.12 in	10.0 mi	SW	4.6 mph	-	N/A		Scattered Clouds
4:35 PM	65.7 °F	44.1 °F	46%	30.11 in	10.0 mi	WNW	4.6 mph	-	N/A		Clear
4:55 PM	64.9 °F	43.7 °F	46%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
5:15 PM	65.3 °F	44.6 °F	47%	30.11 in	10.0 mi	West	4.6 mph	-	N/A		Clear
5:35 PM	64.8 °F	44.1 °F	47%	30.11 in	10.0 mi	West	3.5 mph	-	N/A		Clear
5:55 PM	63.9 °F	43.9 °F	48%	30.11 in	10.0 mi	WNW	4.6 mph	-	N/A		Clear
6:15 PM	63.0 °F	44.2 °F	50%	30.10 in	10.0 mi	West	3.5 mph	-	N/A		Clear
6:35 PM	62.6 °F	44.6 °F	52%	30.10 in	10.0 mi	West	3.5 mph	-	N/A		Clear
6:55 PM	61.5 °F	44.6 °F	54%	30.10 in	10.0 mi	WSW	3.5 mph	-	N/A		Clear
7:15 PM	57.4 °F	47.7 °F	70%	30.09 in	10.0 mi	SW	3.5 mph	-	N/A		Clear
7:35 PM	53.8 °F	46.9 °F	78%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
7:55 PM	54.0 °F	47.3 °F	78%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
8:15 PM	51.4 °F	46.8 °F	84%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
8:35 PM	51.6 °F	47.5 °F	86%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
8:55 PM	54.5 °F	48.0 °F	79%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:15 PM	53.6 °F	48.0 °F	81%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:35 PM	51.4 °F	48.0 °F	88%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:55 PM	50.0 °F	47.1 °F	90%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:15 PM	50.0 °F	47.7 °F	92%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:35 PM	48.9 °F	47.8 °F	96%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:55 PM	50.4 °F	48.4 °F	93%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:15 PM	48.4 °F	46.9 °F	95%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:35 PM	46.6 °F	45.5 °F	96%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:55 PM	47.3 °F	46.4 °F	97%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear

*Meteorological data was obtained from the National Weather Service via the weatherunderground.com website

Horsehead Corporation - Chicago Plant

September 15, 2014 Meteorological Data from Chicago Midway Airport - KMDW

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:51 AM	55.0 °F	46.9 °F	74%	30.18 in	10.0 mi	SSW	4.6 mph	-	N/A		Scattered Clouds
1:51 AM	55.0 °F	48.0 °F	77%	30.18 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
2:51 AM	55.0 °F	48.0 °F	77%	30.17 in	10.0 mi	Calm	Calm	-	N/A		Mostly Cloudy
3:51 AM	55.4 °F	46.4 °F	72%	30.15 in	10.0 mi	South	3.5 mph	-	N/A		Mostly Cloudy
4:51 AM	55.9 °F	46.9 °F	72%	30.14 in	10.0 mi	SSW	3.5 mph	-	N/A		Mostly Cloudy
5:51 AM	55.9 °F	48.9 °F	77%	30.14 in	10.0 mi	Calm	Calm	-	0.00 in		Mostly Cloudy
6:51 AM	57.2 °F	48.2 °F	72%	30.14 in	10.0 mi	South	4.6 mph	-	N/A		Overcast
7:51 AM	57.0 °F	48.9 °F	74%	30.14 in	10.0 mi	Variable	5.8 mph	-	0.00 in	Rain	Light Rain
8:51 AM	57.0 °F	50.0 °F	77%	30.16 in	10.0 mi	SW	9.2 mph	-	0.00 in		Overcast
9:51 AM	60.1 °F	50.0 °F	69%	30.12 in	10.0 mi	West	3.5 mph	-	N/A		Overcast
10:51 AM	60.1 °F	51.1 °F	72%	30.13 in	10.0 mi	South	6.9 mph	-	N/A		Overcast
11:51 AM	60.1 °F	51.1 °F	72%	30.13 in	10.0 mi	SSW	8.1 mph	-	N/A		Overcast
12:51 PM	60.8 °F	51.8 °F	72%	30.10 in	10.0 mi	SW	11.5 mph	-	N/A		Overcast
1:51 PM	60.1 °F	51.1 °F	72%	30.08 in	10.0 mi	SSW	8.1 mph	-	N/A		Overcast
2:51 PM	59.0 °F	52.0 °F	78%	30.09 in	10.0 mi	WSW	6.9 mph	-	N/A		Overcast
3:39 PM	59.0 °F	52.0 °F	78%	30.09 in	10.0 mi	WNW	5.8 mph	-	N/A		Overcast
3:51 PM	59.0 °F	53.1 °F	81%	30.09 in	10.0 mi	West	5.8 mph	-	N/A		Overcast
4:45 PM	57.2 °F	53.6 °F	88%	30.09 in	9.0 mi	WNW	5.8 mph	-	0.00 in		Light Drizzle
4:51 PM	57.9 °F	53.1 °F	84%	30.09 in	9.0 mi	NW	5.8 mph	-	0.00 in		Light Drizzle
5:37 PM	60.1 °F	54.0 °F	80%	30.10 in	9.0 mi	NNW	5.8 mph	-	0.00 in		Overcast
5:51 PM	59.0 °F	54.0 °F	83%	30.10 in	9.0 mi	NW	4.6 mph	-	0.00 in		Overcast
6:17 PM	60.1 °F	54.0 °F	80%	30.11 in	9.0 mi	NW	5.8 mph	-	N/A		Overcast
6:51 PM	60.1 °F	54.0 °F	80%	30.11 in	9.0 mi	NW	6.9 mph	-	N/A		Overcast
7:04 PM	60.1 °F	53.1 °F	78%	30.11 in	9.0 mi	NNW	9.2 mph	-	0.00 in		Light Drizzle
7:51 PM	60.1 °F	54.0 °F	80%	30.11 in	9.0 mi	North	6.9 mph	-	0.00 in		Overcast
8:13 PM	60.1 °F	54.0 °F	80%	30.12 in	9.0 mi	North	9.2 mph	-	N/A		Overcast
8:51 PM	57.9 °F	52.0 °F	81%	30.14 in	10.0 mi	North	12.7 mph	-	N/A		Overcast
9:29 PM	57.9 °F	52.0 °F	81%	30.14 in	10.0 mi	North	10.4 mph	-	N/A		Overcast
9:51 PM	57.0 °F	51.1 °F	81%	30.15 in	10.0 mi	NNW	9.2 mph	-	N/A		Mostly Cloudy
10:51 PM	55.9 °F	48.9 °F	77%	30.16 in	10.0 mi	NNW	11.5 mph	-	N/A		Mostly Cloudy
11:43 PM	54.0 °F	48.9 °F	83%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Mostly Cloudy
11:51 PM	54.0 °F	50.0 °F	86%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Scattered Clouds

*Meteorological data was obtained from the National Weather Service via the weatherunderground.com website

Horsehead Corporation - Chicago Plant

September 16, 2014 Meteorological Data from Chicago Midway Airport - KMDW

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:51 AM	53.6 °F	48.2 °F	82%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Partly Cloudy
1:51 AM	53.1 °F	48.9 °F	86%	30.17 in	10.0 mi	North	8.1 mph	-	N/A		Partly Cloudy
2:51 AM	51.1 °F	46.9 °F	86%	30.19 in	10.0 mi	WNW	5.8 mph	-	N/A		Partly Cloudy
3:51 AM	50.0 °F	46.4 °F	87%	30.19 in	10.0 mi	WNW	5.8 mph	-	N/A		Partly Cloudy
4:51 AM	48.9 °F	46.0 °F	90%	30.19 in	10.0 mi	WNW	4.6 mph	-	N/A		Clear
5:51 AM	48.0 °F	46.0 °F	93%	30.19 in	10.0 mi	NNW	3.5 mph	-	N/A		Partly Cloudy
6:51 AM	46.9 °F	45.0 °F	93%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Partly Cloudy
7:51 AM	51.1 °F	46.0 °F	83%	30.21 in	10.0 mi	NW	4.6 mph	-	N/A		Partly Cloudy
8:51 AM	55.9 °F	48.0 °F	75%	30.21 in	10.0 mi	NNW	4.6 mph	-	N/A		Partly Cloudy
9:51 AM	60.1 °F	50.0 °F	69%	30.21 in	10.0 mi	Calm	Calm	-	N/A		Partly Cloudy
10:51 AM	61.0 °F	48.0 °F	62%	30.20 in	10.0 mi	South	3.5 mph	-	N/A		Scattered Clouds
11:51 AM	62.1 °F	43.0 °F	50%	30.19 in	10.0 mi	NW	3.5 mph	-	N/A		Scattered Clouds
12:51 PM	64.9 °F	43.0 °F	45%	30.17 in	10.0 mi	Variable	3.5 mph	-	N/A		Scattered Clouds
1:51 PM	66.2 °F	42.8 °F	43%	30.15 in	10.0 mi	Calm	Calm	-	N/A		Scattered Clouds
2:51 PM	68.0 °F	43.0 °F	40%	30.12 in	10.0 mi	Variable	4.6 mph	-	N/A		Partly Cloudy
3:51 PM	68.0 °F	42.1 °F	39%	30.11 in	10.0 mi	NW	6.9 mph	-	N/A		Partly Cloudy
4:51 PM	68.0 °F	42.1 °F	39%	30.10 in	10.0 mi	West	9.2 mph	-	N/A		Partly Cloudy
5:51 PM	66.9 °F	39.9 °F	37%	30.09 in	10.0 mi	NW	10.4 mph	-	N/A		Partly Cloudy
6:51 PM	63.0 °F	48.0 °F	58%	30.09 in	10.0 mi	East	6.9 mph	-	N/A		Partly Cloudy
7:51 PM	62.1 °F	50.0 °F	65%	30.09 in	10.0 mi	East	5.8 mph	-	N/A		Clear
8:51 PM	61.0 °F	51.1 °F	70%	30.09 in	10.0 mi	East	6.9 mph	-	N/A		Clear
9:51 PM	60.8 °F	51.8 °F	72%	30.10 in	10.0 mi	East	3.5 mph	-	N/A		Clear
10:51 PM	57.9 °F	50.0 °F	75%	30.09 in	10.0 mi	East	3.5 mph	-	N/A		Clear
11:51 PM	57.0 °F	48.9 °F	74%	30.08 in	10.0 mi	SE	4.6 mph	-	N/A		Clear

*Meteorological data was obtained from the National Weather Service via the **weatherunderground.com website**

Horsehead Corporation - Chicago Plant

September 15, 2014 Meteorological Data from Gary Chicago International Airport - KGYY

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:15 AM	57.2 °F	52.7 °F	85%	30.16 in	10.0 mi	NNW	11.5 mph	-	N/A		Overcast
12:35 AM	56.3 °F	52.2 °F	86%	30.16 in	10.0 mi	NNW	9.2 mph	16.1 mph	N/A		Mostly Cloudy
12:55 AM	55.8 °F	51.4 °F	85%	30.17 in	10.0 mi	NNW	8.1 mph	-	N/A		Scattered Clouds
1:15 AM	55.0 °F	51.1 °F	86%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Clear
1:35 AM	55.4 °F	50.4 °F	83%	30.17 in	10.0 mi	NNW	11.5 mph	-	N/A		Clear
1:55 AM	55.0 °F	50.5 °F	85%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Clear
2:15 AM	55.6 °F	50.9 °F	84%	30.18 in	10.0 mi	NW	8.1 mph	-	N/A		Scattered Clouds
2:35 AM	56.3 °F	51.3 °F	83%	30.18 in	10.0 mi	NNW	6.9 mph	-	N/A		Overcast
2:55 AM	56.5 °F	51.1 °F	82%	30.18 in	10.0 mi	NW	8.1 mph	-	N/A		Overcast
3:15 AM	54.5 °F	49.3 °F	83%	30.18 in	10.0 mi	West	5.8 mph	-	N/A		Overcast
3:35 AM	54.1 °F	49.3 °F	84%	30.18 in	10.0 mi	West	6.9 mph	-	N/A		Overcast
3:55 AM	53.8 °F	49.5 °F	85%	30.18 in	10.0 mi	West	6.9 mph	-	N/A		Overcast
4:15 AM	53.4 °F	49.1 °F	85%	30.18 in	10.0 mi	West	5.8 mph	-	N/A		Mostly Cloudy
4:45 AM	51.8 °F	48.2 °F	88%	30.18 in	10.0 mi	West	8.1 mph	-	N/A		Mostly Cloudy
5:45 AM	50.0 °F	46.4 °F	87%	30.19 in	10.0 mi	West	4.6 mph	-	N/A		Scattered Clouds
6:45 AM	50.0 °F	46.4 °F	87%	30.20 in	10.0 mi	WNW	4.6 mph	-	N/A		Partly Cloudy
7:45 AM	51.8 °F	50.0 °F	94%	30.21 in	10.0 mi	West	6.9 mph	-	N/A		Partly Cloudy
8:45 AM	57.2 °F	50.0 °F	77%	30.21 in	10.0 mi	WNW	5.8 mph	-	N/A		Partly Cloudy
9:45 AM	60.8 °F	50.0 °F	68%	30.22 in	15.0 mi	WNW	6.9 mph	-	N/A		Scattered Clouds
10:45 AM	62.6 °F	46.4 °F	55%	30.21 in	10.0 mi	WNW	6.9 mph	-	N/A		Scattered Clouds
11:45 AM	64.4 °F	42.8 °F	45%	30.20 in	15.0 mi	Variable	4.6 mph	-	N/A		Scattered Clouds
12:45 PM	64.4 °F	46.4 °F	52%	30.18 in	15.0 mi	NNE	11.5 mph	-	N/A		Scattered Clouds
1:45 PM	66.2 °F	44.6 °F	46%	30.17 in	15.0 mi	NNE	9.2 mph	-	N/A		Scattered Clouds
3:45 PM	66.2 °F	46.4 °F	49%	30.12 in	15.0 mi	ENE	9.2 mph	-	N/A		Partly Cloudy
4:45 PM	64.4 °F	46.4 °F	52%	30.11 in	15.0 mi	NE	5.8 mph	-	N/A		Partly Cloudy
6:45 PM	60.8 °F	51.8 °F	72%	30.10 in	15.0 mi	East	3.5 mph	-	N/A		Partly Cloudy
7:45 PM	53.6 °F	50.0 °F	88%	30.10 in	10.0 mi	ESE	4.6 mph	-	N/A		Clear
8:45 PM	51.8 °F	50.0 °F	94%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:15 PM	50.2 °F	48.4 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:35 PM	49.8 °F	48.2 °F	94%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
9:45 PM	50.0 °F	48.2 °F	94%	30.11 in	10.0 mi	SE	4.6 mph	-	N/A		Clear
9:55 PM	50.4 °F	49.1 °F	95%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:15 PM	48.6 °F	47.1 °F	95%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
10:35 PM	48.2 °F	46.8 °F	95%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
10:55 PM	48.6 °F	47.3 °F	95%	30.10 in	7.0 mi	Calm	Calm	-	N/A		Clear
11:15 PM	50.2 °F	49.1 °F	96%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:35 PM	50.2 °F	48.6 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:55 PM	48.0 °F	46.4 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear

*Meteorological data was obtained from the National Weather Service via the weatherunderground.com website

Horsehead Corporation - Chicago Plant

September 16, 2014 Meteorological Data from Gary Chicago International Airport - KGYY

Time (CDT)	Temp.	Dew Point	Humidity	Pressure	Visibility	Wind Dir	Wind Speed	Gust Speed	Precip	Events	Conditions
12:15 AM	57.2 °F	52.7 °F	85%	30.16 in	10.0 mi	NNW	11.5 mph	-	N/A		Overcast
12:35 AM	56.3 °F	52.2 °F	86%	30.16 in	10.0 mi	NNW	9.2 mph	16.1 mph	N/A		Mostly Cloudy
12:55 AM	55.8 °F	51.4 °F	85%	30.17 in	10.0 mi	NNW	8.1 mph	-	N/A		Scattered Clouds
1:15 AM	55.0 °F	51.1 °F	86%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Clear
1:35 AM	55.4 °F	50.4 °F	83%	30.17 in	10.0 mi	NNW	11.5 mph	-	N/A		Clear
1:55 AM	55.0 °F	50.5 °F	85%	30.17 in	10.0 mi	NNW	9.2 mph	-	N/A		Clear
2:15 AM	55.6 °F	50.9 °F	84%	30.18 in	10.0 mi	NW	8.1 mph	-	N/A		Scattered Clouds
2:35 AM	56.3 °F	51.3 °F	83%	30.18 in	10.0 mi	NNW	6.9 mph	-	N/A		Overcast
2:55 AM	56.5 °F	51.1 °F	82%	30.18 in	10.0 mi	NW	8.1 mph	-	N/A		Overcast
3:15 AM	54.5 °F	49.3 °F	83%	30.18 in	10.0 mi	West	5.8 mph	-	N/A		Overcast
3:35 AM	54.1 °F	49.3 °F	84%	30.18 in	10.0 mi	West	6.9 mph	-	N/A		Overcast
3:55 AM	53.8 °F	49.5 °F	85%	30.18 in	10.0 mi	West	6.9 mph	-	N/A		Overcast
4:15 AM	53.4 °F	49.1 °F	85%	30.18 in	10.0 mi	West	5.8 mph	-	N/A		Mostly Cloudy
4:45 AM	51.8 °F	48.2 °F	88%	30.18 in	10.0 mi	West	8.1 mph	-	N/A		Mostly Cloudy
5:45 AM	50.0 °F	46.4 °F	87%	30.19 in	10.0 mi	West	4.6 mph	-	N/A		Scattered Clouds
6:45 AM	50.0 °F	46.4 °F	87%	30.20 in	10.0 mi	WNW	4.6 mph	-	N/A		Partly Cloudy
7:45 AM	51.8 °F	50.0 °F	94%	30.21 in	10.0 mi	West	6.9 mph	-	N/A		Partly Cloudy
8:45 AM	57.2 °F	50.0 °F	77%	30.21 in	10.0 mi	WNW	5.8 mph	-	N/A		Partly Cloudy
9:45 AM	60.8 °F	50.0 °F	68%	30.22 in	15.0 mi	WNW	6.9 mph	-	N/A		Scattered Clouds
10:45 AM	62.6 °F	46.4 °F	55%	30.21 in	10.0 mi	WNW	6.9 mph	-	N/A		Scattered Clouds
11:45 AM	64.4 °F	42.8 °F	45%	30.20 in	15.0 mi	Variable	4.6 mph	-	N/A		Scattered Clouds
12:45 PM	64.4 °F	46.4 °F	52%	30.18 in	15.0 mi	NNE	11.5 mph	-	N/A		Scattered Clouds
1:45 PM	66.2 °F	44.6 °F	46%	30.17 in	15.0 mi	NNE	9.2 mph	-	N/A		Scattered Clouds
3:45 PM	66.2 °F	46.4 °F	49%	30.12 in	15.0 mi	ENE	9.2 mph	-	N/A		Partly Cloudy
4:45 PM	64.4 °F	46.4 °F	52%	30.11 in	15.0 mi	NE	5.8 mph	-	N/A		Partly Cloudy
6:45 PM	60.8 °F	51.8 °F	72%	30.10 in	15.0 mi	East	3.5 mph	-	N/A		Partly Cloudy
7:45 PM	53.6 °F	50.0 °F	88%	30.10 in	10.0 mi	ESE	4.6 mph	-	N/A		Clear
8:45 PM	51.8 °F	50.0 °F	94%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:15 PM	50.2 °F	48.4 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
9:35 PM	49.8 °F	48.2 °F	94%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
9:45 PM	50.0 °F	48.2 °F	94%	30.11 in	10.0 mi	SE	4.6 mph	-	N/A		Clear
9:55 PM	50.4 °F	49.1 °F	95%	30.11 in	10.0 mi	Calm	Calm	-	N/A		Clear
10:15 PM	48.6 °F	47.1 °F	95%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
10:35 PM	48.2 °F	46.8 °F	95%	30.11 in	7.0 mi	Calm	Calm	-	N/A		Clear
10:55 PM	48.6 °F	47.3 °F	95%	30.10 in	7.0 mi	Calm	Calm	-	N/A		Clear
11:15 PM	50.2 °F	49.1 °F	96%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:35 PM	50.2 °F	48.6 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear
11:55 PM	48.0 °F	46.4 °F	94%	30.10 in	10.0 mi	Calm	Calm	-	N/A		Clear

*Meteorological data was obtained from the National Weather Service via the weatherunderground.com website

EXHIBIT B

Quarterly Visible Emissions and Opacity Report
Horsehead Corporation - Chicago Plant
4th Quarter 2014 Report

QUARTERLY VISIBLE EMISSIONS AND OPACITY REPORT

Horsehead Corporation > Chicago Plant

4th Quarter 2014 Report

Prepared By:

TRINITY CONSULTANTS
1S660 Midwest Road
Suite 250
Oakbrook Terrace, IL 60181
630-495-1470

December 2014

Project 141401.0179

Trinity Consultants

Environmental solutions delivered uncommonly well

1. EXECUTIVE SUMMARY

On December 15 and 19, 2014, Trinity Consultants (Trinity) performed visible emissions observations at the Horsehead Corporation (Horsehead) Chicago Plant. These observations were conducted to comply with the City of Chicago Department of Public Health (CDPH) Rules and Regulations for Bulk Materials Storage (CDPH Bulk Storage Rules)[1], Sections 3.0(2)(d) and 3.0(3)(f)(ii) which require the facility to conduct quarterly testing to demonstrate compliance with the prohibition on fugitive dust set forth in 3.0(2)(b). The quarterly testing followed the protocol established in section 3.1.7.1 – Quarterly Visible Emissions and Opacity Testing of the Consolidated Fugitive Dust Control Plan and Operating program for Fugitive Particulate Matter for Horsehead Corporation (Chicago Plant), June 11, 2014.[2] The opacity observations were conducted in accordance with the requirements of 40 Code of Federal Regulations (CFR) 60, Appendix A, Method 9 (USEPA Method 9) and the visible emissions observations were conducted in accordance with the requirements of 40 CFR 60, Appendix A, Method 22 (USEPA Method 22).[3]

Supporting information for the report is included in the appendices. The visible emissions and opacity observations for the fourth quarter report were conducted by Mr. Jacob Beckerman and Mr. Erich Yaeger, both of Trinity. A copy of each observer's current Method 9 certification is included in Appendix A.[4] A site plan of the Chicago Plant, denoting the locations of fugitive dust emissions sources, is included in Appendix B. The visible emissions and opacity observations data sheets are included in Appendix C. Meteorological data from December 15 and 19, 2014 for the Horsehead Chicago Plant is included in Appendix D which indicates that the observations were included over a range of weather conditions occurring over this period.[5] Data from a weather monitoring station located inside the Horsehead Facility has been included and summarizes the weather conditions on the dates of observation.[6]

The results of the December 15 and 19, 2014 tests demonstrated that there were no instances of visible dust beyond the property line of the facility and that all affected sources were below the opacity limit of 10% pursuant to CDPH Bulk Storage Rules Section 3.0(2)(a) and (b), respectively. A summary of the results is included in Section 2 of this report.

---

[1] Article II. Air Pollution Control Rules and Regulations, Part B: Bulk Solid Material Facilities.
[2] While Horsehead submitted the Consolidated Fugitive Dust Control Plan and Operating Program for Fugitive Particulate Matter for Horsehead Corporation (Chicago Plant) to the City of Chicago on June 11, 2014, there has been no formal approval of such plan from the City of Chicago to Horsehead.
[3] Visible emissions and opacity observation methods used as specified in CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a).
[4] Per CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a) a professional trained and certified to read opacity in accordance with 40 CFR 60, Appendix A, Method 9 shall conduct the opacity observations.
[5] Per CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(b), observations were included over a range of weather conditions.
[6] Horsehead installed the weather monitoring station to comply with the wind monitoring requirements per CDPH Bulk Storage Rules Section 3.0(5) in accordance with the variance request submitted to the City of Chicago dated June 13, 2014.

2. VISIBLE EMISSIONS AND OPACITY OBSERVATIONS RESULTS SUMMARY

The following table summarizes the results of all of the visible emissions and opacity observations conducted for the fourth quarter of 2014. As previously discussed, all observations of opacity for fugitive dust emissions sources were conducted in accordance with USEPA Method 9, and all of the property line visible emissions observations were conducted in accordance with USEPA Method 22.[7] Observation points were selected to comply with the requirement of CDPH Bulk Storage Rules Section 3.0(2)(a) to verify that there was no fugitive dust that is visible beyond the property line and with CDPH Bulk Storage Rules Section 3.0(2)(b) to verify that any bulk solid material storage pile, transfer point, roadway, or parking area does not exceed the 10% opacity limit.[8]

Table 2. Horsehead Corporation (Chicago Plant) 4th Quarter 2014 Visible Emissions and Opacity Summary

Location	Type of Fugitive Emissions Source	Duration of Observation (Minutes)	Average Opacity (%)
IRM Truck Loading[1]	Transfer Point	7	0
Coke Hopper[2]	Transfer Point	3	0
Off Spec Coke Pile	Material Storage Pile	20	0
Temp. IRM Storage Pile (East of Coke Pile)	Material Storage Pile	20	0
Temporary IRM Storage Pile	Material Storage Pile	20	0
Main IRM Storage Pile	Material Storage Pile	20	0
Coke Loading Pile	Material Storage Pile	20	0
West Coke Pile	Material Storage Pile	20	0
East Coke Pile	Material Storage Pile	20	0
Main IRM Storage Bunkers	Material Storage Pile	20	0
Paved Road – Main Truck Road	Roadway	4 Vehicle Passes	0
Parking Lot	Roadway	4 Vehicle Passes	0
Paved Road – To IRM Truck Loading	Roadway	4 Vehicle Passes	0
Unpaved Road – Section of 114th Street	Roadway	4 Vehicle Passes	0
Property Line Locations (Method 22)[3]	Property Line	8 x 10 minutes	No visible emissions
IRM Barge Loading Hopper and Loading Conveyor/Chute[4]	Transfer Point	N/A	N/A

1. Observations were taken while IRM was being loaded into trucks. A total of 3 trucks were loaded, lasting a total of 7 minutes
2. Observations were taken while coke was being loaded into the hopper. The process of loading the coke took a total of 3 minutes.
3. There were 8 property line observations conducted using EPA Method 22: North property line looking east and west, east property line looking north and south, south property line looking east and west, southwest property line looking northeast, and the west property line looking north.
4. Per a conversation with John Marta on 12/15/14, no IRM barge loading activities were scheduled for the days of observations or for the remainder of 2014. Therefore, no readings during IRM barge loading were taken for the fourth quarter.

[7] Visible emissions and opacity observation methods used as specified in CDPH Bulk Storage Rules Section 3.0(3)(f)(ii)(a).

[8] CDPH Bulk Storage Rules Section 2.0 an Internal Road is defined as, any route within a facility that is not located in an area normally used for staging or storage of material and that has evidence of repeated prior travel by, or is otherwise regularly used by vehicles for transporting materials to, from or, or within the facility. A Transfer Point is the location at or within a facility where material being moved, carried, or conveyed is dropped or deposited.

The Method 9 opacity observation results for the coke storage areas, coke pile material handling, IRM storage piles, IRM pile handling, IRM truck loading, paved roadways, and unpaved roadways were all below the 10% opacity standard promulgated in the CDPH's Bulk Storage Rules. Additionally, the Method 22 observations of visible emissions at the property boundaries showed no visible emissions crossing the plant property lines.

As discussed in the executive summary, supporting information for the report is included in the appendices. Copies of Mr. Beckerman and Mr. Yaeger's current Method 9 certifications are included in Appendix A. A site plan of the Chicago Plant, denoting the locations of fugitive dust emissions sources, is included in Appendix B. The visible emissions and opacity observations data sheets are included in Appendix C. Meteorological data from December 15 and 19, 2014 for the Horsehead Chicago Plant is included in Appendix D.

APPENDIX A: METHOD 9 VISIBLE EMISSIONS OBSERVER CERTIFICATION

AeroMet
Engineering, Inc.
Solutions for a Changing Environment

Certification of Visible Opacity Reading

Jacob Beckerman

qualified to conduct EPA Method 9 Tests for visible opacity in accordance with the methods established for such qualification in 40 CFR Part 60 Appendix A.

Certification Date: September 25, 2014 Expiration Date: March 25, 2015

AeroMet Instructor: Josh Haslag

AeroMet
Engineering, Inc.
Solutions for a Changing Environment

Certification of Visible Opacity Reading

Erich Yaeger

qualified to conduct EPA Method 9 Tests for visible opacity in accordance with the methods established for such qualification in 40 CFR Part 60 Appendix A.

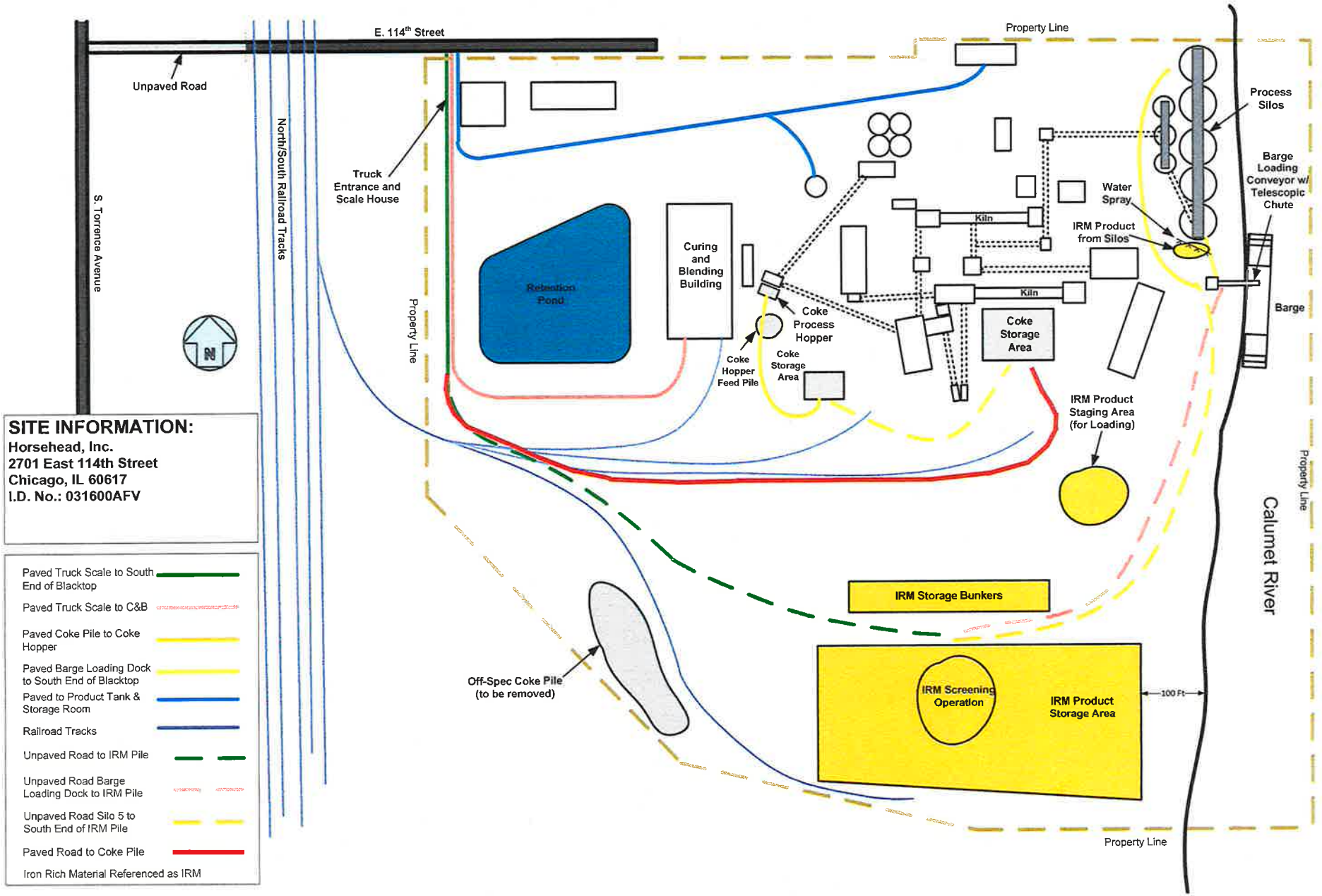
Certification Date: September 25, 2014

Expiration Date: March 25, 2015

AeroMet Instructor:

Josh Haslag

APPENDIX B: FACILITY SITE DIAGRAM


E. 114th Street
Unpaved Road
S. Torrence Avenue
North/South Railroad Tracks
Truck Entrance and Scale House
Property Line
Retention Pond
Curing and Blending Building
Coke Hopper Feed Pile
Coke Storage Area
Coke Process Hopper
Kiln
Kiln
Coke Storage Area
Water Spray
IRM Product from Silos
Process Silos
Barge Loading Conveyor w/ Telescopic Chute
Barge
IRM Product Staging Area (for Loading)
Property Line
Calumet River
IRM Storage Bunkers
Off-Spec Coke Pile (to be removed)
IRM Screening Operation
IRM Product Storage Area
100 Ft
Property Line
N
SITE INFORMATION:
Horsehead, Inc.
2701 East 114th Street
Chicago, IL 60617
I.D. No.: 031600AFV
Paved Truck Scale to South End of Blacktop
Paved Truck Scale to C&B
Paved Coke Pile to Coke Hopper
Paved Barge Loading Dock to South End of Blacktop
Paved to Product Tank & Storage Room
Railroad Tracks
Unpaved Road to IRM Pile
Unpaved Road Barge Loading Dock to IRM Pile
Unpaved Road Silo 5 to South End of IRM Pile
Paved Road to Coke Pile
Iron Rich Material Referenced as IRM

APPENDIX C: VISIBLE EMISSIONS AND OPACITY OBSERVATIONS DATA SHEETS

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: IRM Truck Loading | OPERATING MODE: Loading Trucks

CONTROL EQUIPMENT: Watering | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START Load IRM into Trucks

HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15 ft

DISTANCE FROM OBSERVER: START 50 ft STOP 50 ft | DIRECTION FROM OBSERVER: START SW STOP SW

DESCRIBE EMISSIONS: START None → No emissions | STOP None → No emissions

EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES ☑ Steam | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 3 ft above truck STOP 3 ft above truck

DESCRIBE BACKGROUND: START Grey Sky STOP Grey Sky

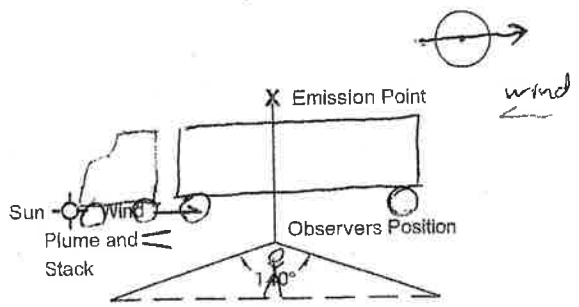
BACKGROUND COLOR: START Grey STOP Grey | SKY CONDITIONS: START STOP

WIND SPEED: START 5-10 mph STOP 0-5 mph | WIND DIRECTION: START From N STOP From N

AMBIENT TEMP: START 29 °F STOP 29 °F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch

Draw North Arrow



Overcast, no sun

OBSERVATION DATE	START TIME	STOP TIME
12/19/14	7:51 am	7:58 am

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
~~16~~					~~46~~				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 %

NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0 % MINIMUM 0 % MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS: 3 trucks loaded during event. IRM pile watered before loading into trucks. Steam escapes IRM during loading

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14

ORGANIZATION: Trinity Consultants

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE | DATE

CERTIFIED BY: Aeronet Engineering Inc | DATE: 9/25/14

VERIFIED BY: | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 JB | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: COKE LOADING | OPERATING MODE: LOADING

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START HOPPER

HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15ft JB

DISTANCE FROM OBSERVER: START 50 ft STOP 50 ft | DIRECTION FROM OBSERVER: START N STOP N JB

DESCRIBE EMISSIONS: START NONE STOP None JB

EMISSION COLOR: START NONE STOP None JB | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☒ YES ☐ N/A | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ N/A

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 2 ft ABOVE HOPPER STOP Same JB

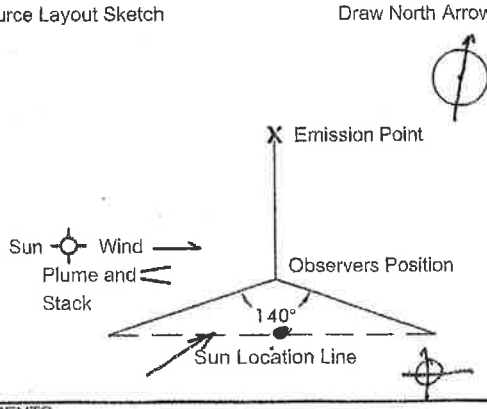
DESCRIBE BACKGROUND: START TAN BLDG / OVCST SKY STOP (SAME)

BACKGROUND COLOR: START ↙ STOP ↗ | SKY CONDITIONS: START OVERCAST STOP OVERCAST

WIND SPEED: START 0-5 MPH STOP 0-5mph JB | WIND DIRECTION: START 0-5 MPH STOP SAME

AMBIENT TEMP: START 45 F STOP 45 F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



OBSERVATION DATE	START TIME	STOP TIME
12/15/2014	7:55	7:58

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4					34				
5					35				
6					36				
7					37				
8					38				
9					39				
10					40				
11					41				
12					42				
13					43				
14					44				
15					45				
16					46				
17					47				
18					48				
19					49				
20					50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 %

NUMBER OF READINGS ABOVE: ALL 0 % WERE

RANGE OF OPACITY READINGS: 0 % MINIMUM | 0 % MAXIMUM

OBSERVER'S NAME (PRINT): ERICH YAEGER

COMMENTS: ENTIRE LOADING EVENT OBSERVED (APPROX. 3 MIN)

OBSERVER'S SIGNATURE | DATE: 12/15/2014

ORGANIZATION: TRINITY CONSULTANTS, INC.

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

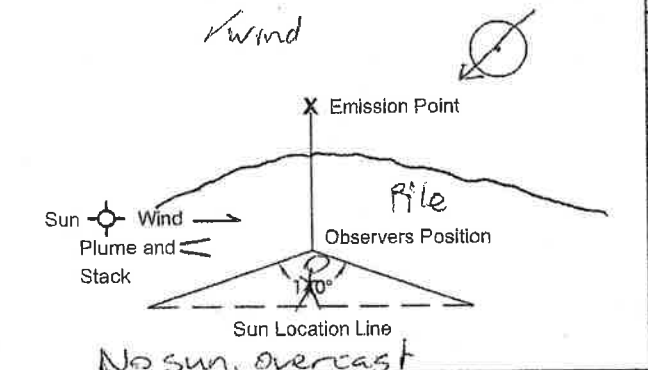
CERTIFIED BY: AEROMET ENGINEERING | DATE: 9/25/2014

VERIFIED BY: Jacob Beckerman | DATE: 12/23/14

Visible Emissions Observations Form

SOURCE NAME: Horsehead Corporation (Chicago Plant)
ADDRESS: 2701 East 114th Street
CITY: Chicago | STATE: IL | ZIP: 60617
PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV
PROCESS EQUIPMENT: Off-spec coke pile | OPERATING MODE: N/A
CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A
DESCRIBE EMISSION POINT: START Coke storage pile
HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 15 ft STOP 15 ft
DISTANCE FROM OBSERVER: START 60 ft STOP 60 ft | DIRECTION FROM OBSERVER: START SE STOP SE
DESCRIBE EMISSIONS: START None → No emissions STOP None → No emissions
EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above pile surface STOP 4ft above surface
DESCRIBE BACKGROUND: START Trees/Sky STOP Trees/Sky
BACKGROUND COLOR: START Grey/Tan STOP Grey/Tan | SKY CONDITIONS: START Overcast STOP Overcast
WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START From S STOP From S
AMBIENT TEMP: START 45 °F STOP 45 °F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



No sun, overcast

OBSERVATION DATE	START TIME	STOP TIME
12/15/14	10:16 am	10:36 am

SEC MIN	0	15	30	45	SEC MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0%
NUMBER OF READINGS ABOVE: All 0 % WERE
RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT): Jacob Beckerman
OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14
ORGANIZATION: Trinity Consultants
CERTIFIED BY: Aeromet Engineering Inc | DATE: 9/25/14
VERIFIED BY: | DATE:

COMMENTS

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE | TITLE | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Temporary IRM Pile → East of East Coke Pile | OPERATING MODE: N/A

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START IRM Storage Pile

HEIGHT ABOVE GROUND LEVEL: 10 ft | HEIGHT RELATIVE TO OBSERVER: START 10 ft STOP 10 ft

DISTANCE FROM OBSERVER: START 30 ft STOP 30 ft | DIRECTION FROM OBSERVER: START N STOP N

DESCRIBE EMISSIONS: START None → no emissions STOP None → no emissions

EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4 ft above pile surface STOP 4 ft above surface

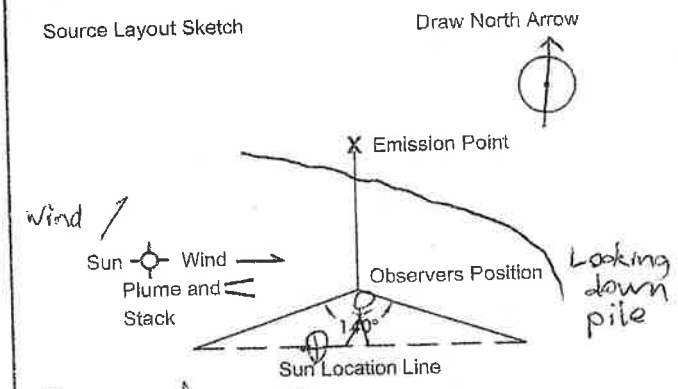
DESCRIBE BACKGROUND: START Brown building STOP Brown building

BACKGROUND COLOR: START Brown STOP Brown | SKY CONDITIONS: START Overcast STOP Overcast

WIND SPEED: START 5-10 mph STOP 0-5 mph | WIND DIRECTION: START From S STOP From S

AMBIENT TEMP: START 45°F STOP 45°F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



Overcast, no Sun

COMMENTS:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE: | TITLE: | DATE:

OBSERVATION DATE: 12/15/14 | START TIME: 12:45 pm | STOP TIME: 1:05 pm

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21					51				
22					52				
23					53				
24					54				
25					55				
26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14

ORGANIZATION: Trinity Consultants

CERTIFIED BY: Aeronet Engineering Inc | DATE: 9/25/14

VERIFIED BY: | DATE:

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Temporary IRM Storage Pile | OPERATING MODE: N/A

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START IRM storage pile → Near barge loading

HEIGHT ABOVE GROUND LEVEL: 18 ft | HEIGHT RELATIVE TO OBSERVER: START 18 ft STOP 18 ft

DISTANCE FROM OBSERVER: START 70 ft STOP 70 ft | DIRECTION FROM OBSERVER: START N STOP N

DESCRIBE EMISSIONS: START None → No emissions STOP None → No emissions

EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES ☑ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4 ft above pile surface STOP 4 ft above surface

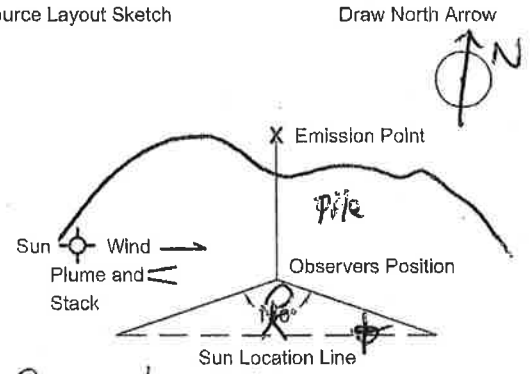
DESCRIBE BACKGROUND: START Grey Sky/Tan Silo STOP Grey Sky/Tan Silo

BACKGROUND COLOR: START Grey/Tan STOP Grey/Tan | SKY CONDITIONS: START Overcast STOP Overcast

WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START From S STOP From S

AMBIENT TEMP: START 45°F STOP 45°F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



Overcast, no sun

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
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14	0	0	0	0	44				
15	0	0	0	0	45				
~~16~~	0	0	0	0	~~46~~				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
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23					53				
24					54				
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27					57				
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29					59				
30					60				

OBSERVATION DATE: 12/15/14 | START TIME: 8:45 am | STOP TIME: 9:05 am

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS: IRM from conveyor loading into pile. No emissions, steam from hot IRM present.

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14

ORGANIZATION: Trinity Consultants

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

CERTIFIED BY: Aeromet Engineering Inc | DATE: 9/25/14

VERIFIED BY: | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: Main IRM Storage Pile | OPERATING MODE: N/A

CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A

DESCRIBE EMISSION POINT: START IRM Storage Pile

HEIGHT ABOVE GROUND LEVEL: 50 ft | HEIGHT RELATIVE TO OBSERVER: START 20 ft STOP 20 ft

DISTANCE FROM OBSERVER: START 75 ft STOP 75 ft | DIRECTION FROM OBSERVER: START W STOP W

DESCRIBE EMISSIONS: START None → No emissions STOP None → No emissions

EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above surface STOP 4ft above surface

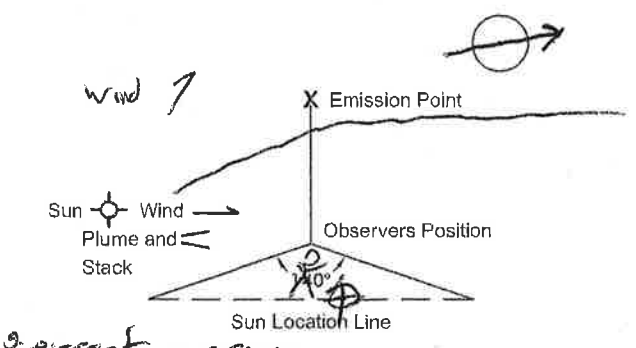
DESCRIBE BACKGROUND: START Grey Sky STOP Grey Sky

BACKGROUND COLOR: START Grey STOP Grey | SKY CONDITIONS: START Overcast STOP Overcast

WIND SPEED: START 0-5 mph STOP 0-5 mph | WIND DIRECTION: START from E STOP From S

AMBIENT TEMP: START 45°F STOP 45°F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch — Draw North Arrow



Overcast; no sun

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
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5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
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17	0	0	0	0	47				
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20	0	0	0	0	50				
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29					59				
30					60				

OBSERVATION DATE: 12/15/14 | START TIME: 9:23 am | STOP TIME: 9:43 am

AVERAGE OPACITY FOR HIGHEST PERIOD: 0% | NUMBER OF READINGS ABOVE: All 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM

OBSERVER'S NAME (PRINT): Jacob Beckerman

COMMENTS

OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14

ORGANIZATION: Trinity Consultants

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE

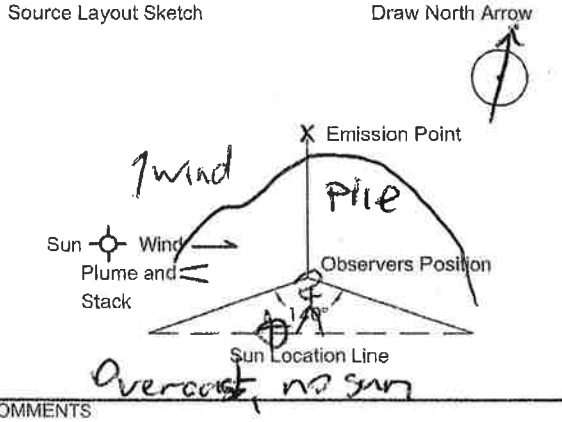
TITLE | DATE

CERTIFIED BY: Aeromet Engineering Inc | DATE: 9/25/14

VERIFIED BY: | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)
ADDRESS: 2701 East 114th Street
CITY: Chicago | STATE: IL | ZIP: 60617
PHONE: 773-933-9263 | SOURCE ID NUMBER: 031600AFV
PROCESS EQUIPMENT: Coke Loading Pile | OPERATING MODE: N/A
CONTROL EQUIPMENT: N/A | OPERATING MODE: N/A
DESCRIBE EMISSION POINT: START Coke Pile
HEIGHT ABOVE GROUND LEVEL: 15 ft | HEIGHT RELATIVE TO OBSERVER: START 17 ft STOP 17 ft
DISTANCE FROM OBSERVER: START 45 ft STOP 45 ft | DIRECTION FROM OBSERVER: START NE STOP NE
DESCRIBE EMISSIONS: START None → No emissions STOP None → No emissions
EMISSION COLOR: START None STOP None | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐
WATER DROPLETS PRESENT: NO ☑ YES ☐ | IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4 ft above surface STOP 4 ft above surface
DESCRIBE BACKGROUND: START Grey Building STOP Grey Building
BACKGROUND COLOR: START Grey STOP Grey | SKY CONDITIONS: START Overcast STOP Overcast
WIND SPEED: START 0-5 mph STOP 25 mph | WIND DIRECTION: START From STOP From S
AMBIENT TEMP: START 45 °F STOP 45 °F | WET BULB TEMP: N/A | RH.percent: N/A

Source Layout Sketch



OBSERVATION DATE: 12/15/14 | START TIME: 11:17 am | STOP TIME: 11:37 am

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
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29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 %
NUMBER OF READINGS ABOVE: All 0 % WERE
RANGE OF OPACITY READINGS: 0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT): Jacob Beckerman
COMMENTS
OBSERVER'S SIGNATURE: Jacob Beckerman | DATE: 12/15/14
ORGANIZATION: Trinity Consultants
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
CERTIFIED BY: Aeromet Engineering Inc | DATE: 9/25/14
TITLE | DATE
VERIFIED BY: | DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)	OBSERVATION DATE: 12/15/14	START TIME: 8:11 am
ADDRESS: 2701 East 114th Street		STOP TIME: 8:32 am
CITY: Chicago	STATE: IL	ZIP: 60617
PHONE: 773-933-9263	SOURCE ID NUMBER: 031600AFV	
PROCESS EQUIPMENT: West Coke Pile	OPERATING MODE: N/A	
CONTROL EQUIPMENT: N/A	OPERATING MODE: N/A	
DESCRIBE EMISSION POINT: START Coke Storage Pile		
HEIGHT ABOVE GROUND LEVEL: 20 ft	HEIGHT RELATIVE TO OBSERVER: START 20 ft STOP 20 ft	
DISTANCE FROM OBSERVER: START 60 ft STOP	DIRECTION FROM OBSERVER: START NW STOP NW	
DESCRIBE EMISSIONS: START None → No emissions	STOP None → No emissions	
EMISSION COLOR: START None STOP None	PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☑ YES ☐	IF WATER DROPLET PLUME: N/A ATTACHED ☐ DETACHED ☐	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 4ft above pile	STOP 4ft above pile	
DESCRIBE BACKGROUND: START Grey Sky/Tan Building	STOP Grey Sky / Tan Building	
BACKGROUND COLOR: START Grey/Tan STOP Grey/Tan	SKY CONDITIONS: START Overcast STOP Overcast	
WIND SPEED: START 5-10 mph STOP 0-5 mph	WIND DIRECTION: START From W STOP From E	
AMBIENT TEMP: START 45°F STOP 45°F	WET BULB TEMP: N/A	RH.percent: N/A

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
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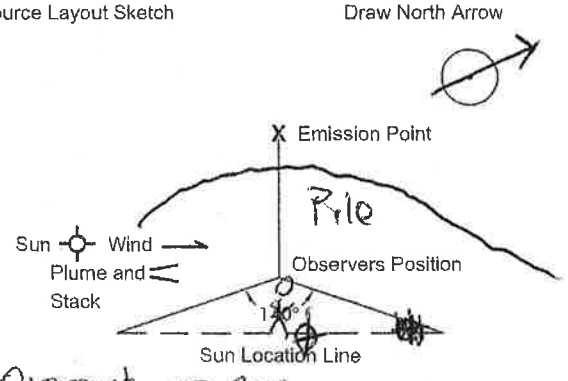
30					60				

Source Layout Sketch



Overcast, no sun

AVERAGE OPACITY FOR HIGHEST PERIOD: 0%	NUMBER OF READINGS ABOVE: All 0 % WERE
RANGE OF OPACITY READINGS: 0% MINIMUM	0% MAXIMUM
OBSERVER'S NAME (PRINT): Jacob Beckerman	
COMMENTS	OBSERVER'S SIGNATURE: Jacob Beckerman — DATE: 12/15/14
	ORGANIZATION: Trinity Consultants
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS — SIGNATURE	CERTIFIED BY: Aeromet Engineering Inc — DATE: 9/25/14
TITLE — DATE	VERIFIED BY: — DATE

SOURCE NAME: Horsehead Corporation (Chicago Plant)

ADDRESS: 2701 East 114th Street

CITY: Chicago | STATE: IL | ZIP: 60617

PHONE: 773-933-9263 JB | SOURCE ID NUMBER: 031600AFV

PROCESS EQUIPMENT: EAST COKE PILE | OPERATING MODE: N/A

CONTROL EQUIPMENT: WATERING | OPERATING MODE: N/A

DESCRIBE EMISSION POINT

START: PILED COKE

HEIGHT ABOVE GROUND LEVEL: 20 FT | HEIGHT RELATIVE TO OBSERVER: START 20 ft JB STOP 20 ft JB

DISTANCE FROM OBSERVER: START 60 FT STOP SAME | DIRECTION FROM OBSERVER: START NW STOP NW

DESCRIBE EMISSIONS

START: NO EMISSIONS STOP: NO emissions JB

EMISSION COLOR: START N/A STOP N/A JB | PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐

WATER DROPLETS PRESENT: NO ☐ YES ☐ N/A | IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐ N/A

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED

START: 2-3 FT ABOVE PILE STOP: (SAME)

DESCRIBE BACKGROUND

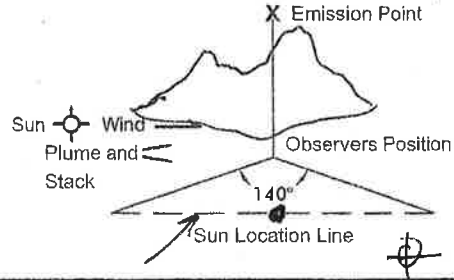
START: TAN BLDG | STOP: Same JB

BACKGROUND COLOR: START / STOP / | SKY CONDITIONS: START OVERCAST STOP SAME

WIND SPEED: START 0-5 MPH STOP 0-5 mph JB | WIND DIRECTION: START SW STOP SAME

AMBIENT TEMP: START 45 F STOP SAME | WET BULB TEMP: N/A | RH,percent: N/A

Source Layout Sketch



OBSERVATION DATE: 12/15/2014 | START TIME: 8:12 AM | STOP TIME: 8:32 AM

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
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12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
~~16~~	~~0~~	~~0~~	~~0~~	~~0~~	~~46~~				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
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27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 % | NUMBER OF READINGS ABOVE: ALL 0 % WERE

RANGE OF OPACITY READINGS: 0% MINIMUM | 0% MAXIMUM

OBSERVER'S NAME (PRINT): ERICK YAEGER

OBSERVER'S SIGNATURE | DATE: 12/15/2014

ORGANIZATION: TRINITY CONSULTANTS

COMMENTS: NO EMISSIONS OBSERVED

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE | DATE

CERTIFIED BY: AEROMET ENGINEERING | DATE: 9/25/2014

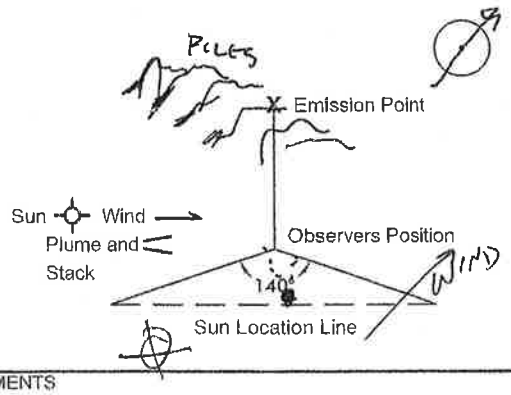
VERIFIED BY: Jacob Beckerman | DATE: 12/23/14

BUNKERS

Visible Emissions Observations Form

SOURCE NAME	Horsehead Corporation (Chicago Plant)
ADDRESS	2701 East 114th Street
CITY	Chicago
STATE	IL
ZIP	60617
PHONE	[redacted] 773-433-9263
SOURCE ID NUMBER	031600AFV
PROCESS EQUIPMENT	IRM STORAGE BUNKERS
OPERATING MODE	N/A
CONTROL EQUIPMENT	WATERING
OPERATING MODE	N/A
DESCRIBE EMISSION POINT START	PILES STORING IRM
HEIGHT ABOVE GROUND LEVEL	15 ft
HEIGHT RELATIVE TO OBSERVER START	15 ft STOP 15 ft
DISTANCE FROM OBSERVER START	50 ft STOP SAME
DIRECTION FROM OBSERVER START	NE STOP SAME
DESCRIBE EMISSIONS START	NO EMISSIONS STOP No emissions JB
EMISSION COLOR START	N/A STOP N/A JB
PLUME TYPE: CONTINUOUS ☐ FUGITIVE ☑ INTERMITTENT ☐	
WATER DROPLETS PRESENT: NO ☐ YES ☐	N/A
IF WATER DROPLET PLUME: ATTACHED ☐ DETACHED ☐	N/A
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	3 ft ABOVE PILE STOP SAME
DESCRIBE BACKGROUND START	TAN PROCESS EQT STOP SAME
BACKGROUND COLOR START	TAN STOP Same JB
SKY CONDITIONS START	OVERCAST STOP SAME
WIND SPEED START	0-5 STOP SAME
WIND DIRECTION START	N/NW STOP SAME
AMBIENT TEMP START	[redacted] STOP SAME
WET BULB TEMP	N/A
RH.percent	N/A

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	12/15/2014
START TIME	9:31
STOP TIME	9:51

SEC / MIN	0	15	30	45	SEC / MIN	0	15	30	45
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2	0	0	0	0	32				
3	0	0	0	0	33				
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5	0	0	0	0	35				
6	0	0	0	0	36				
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17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
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26					56				
27					57				
28					58				
29					59				
30					60				

AVERAGE OPACITY FOR HIGHEST PERIOD	0%
NUMBER OF READINGS ABOVE	ALL 0 % WERE
RANGE OF OPACITY READINGS	0% MINIMUM 0% MAXIMUM
OBSERVER'S NAME (PRINT)	ERICH YAEGER
OBSERVER'S SIGNATURE	[signature]
DATE	12/15/14
ORGANIZATION	TRINITY CONSULTANTS
CERTIFIED BY:	AEROMET ENGINEER WG
DATE	9/25/2014
VERIFIED BY:	Jacob Beckerman
DATE	12/23/14

COMMENTS: NO EMISSIONS OBSERVED

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SIGNATURE

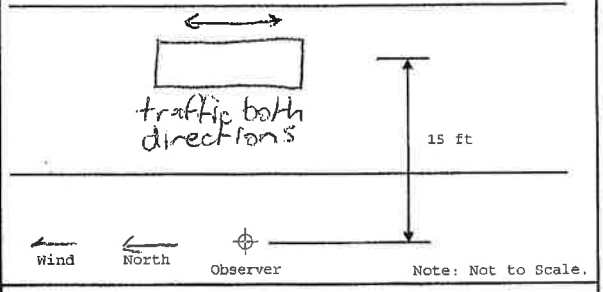
TITLE

DATE

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: Horsehead Corporation	Provide sketch of observer's position relative to the source:
Address: 2701 East 114th Street Chicago, IL 60617	
Facility ID: 031600AFV	
Date: 12/15/14	
Location Description: Paved Road - Main truck road	
Control Device: Wetting / Sweeping	
Hours of Observation: < 1 hour	
Observer's Name: Jacob Beckerman	
Certification Date of Observer: 9/25/14	Observer's Affiliation:
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	10:46 am	Final	11:08 am
OBSERVER LOCATION				
Distance to discharge	**15 ft**		**15 ft**	
Direction from discharge	**90 degrees**		**90 degrees**	
Height of observation point	**4 ft**		**4 ft**	
BACKGROUND DESCRIPTION	Road / Gravel		Road / Gravel	
WEATHER CONDITIONS				
Wind Direction	**From the** South		**From the** South	
Wind Speed	0-5 **mph**		0-5 **mph**	
Ambient Temperature	45 **°F**		45 **°F**	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	Overcast		Overcast	
PLUME DESCRIPTION				
Color	None		None	
Distance Visible	< 1 **miles**		< 1 **miles**	
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity (%)	
	Start - End	Sum	Average
1	10:46:30 - 10:46:45	0	0
2	10:54:15 - 10:54:30	0	0
3	10:59:15 - 10:59:30	0	0
4	11:08:45 - 11:09:00	0	0

Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways (Cont.)

Company Horsehead Corporation Observer Jacob Beckerman

Location Paved Road - Main Truck Road Facility Type Secondary Refining of non ferrous metals

Point of emissions **Roadway/Tire Interface**

Vehicle Pass #	Seconds			Vehicle Type
	0	5	10	
1	0	0	0	Heavy Truck
2	0	0	0	Heavy Truck
3	0	0	0	Heavy Truck
4	0	0	0	Heavy Truck

Description of Road (Paved/Unpaved, Dry/Wet): Paved, Wet

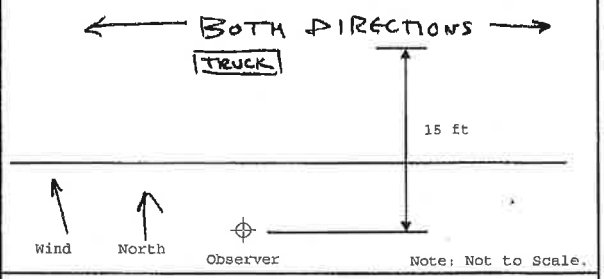
Jacob Beckerman
Observer Signature

12/15/14
Date

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: HORSEHEAD CORP.	Provide sketch of observer's position relative to the source:
Address: 2701 EAST 114TH ST. CHICAGO, IL 60617	
Facility ID: 0316 00AFV	
Date: 12/15/2014	
Location Description: PARKING LOT	
Control Device: N/A	
Hours of Observation: 12:12 - 12:16 PM	
Observer's Name: ERICH YAEGER	
Certification Date of Observer: 9/25/2014	Observer's Affiliation: TRINITY CONSULTANTS
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	12:12 PM	Final	12:16 PM
OBSERVER LOCATION				
Distance to discharge	15 ft		15 ft	
Direction from discharge	90 degrees		90 degrees	
Height of observation point	4 ft		4 ft	
BACKGROUND DESCRIPTION	DARK STORAGE PILE		Same JB	
WEATHER CONDITIONS				
Wind Direction	From the S		From the S JB	
Wind Speed	5-10 mph		SAME mph	
Ambient Temperature	45 F		Same JB F	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	OVERCAST		SAME	
PLUME DESCRIPTION				
Color	NO EMISSIONS		NO emissions JB	
Distance Visible	N/A miles		N/A JB miles	
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start - End	Opacity (%) Sum	Opacity (%) Average
1	12:13 - 12:13	0	0
2	12:15 - 12:15	0	0
3	12:15 - 12:15	0	0
4	12:16 - 12:16	0	0

Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0 %

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways (Cont.)

Company HORSHEAD CORP. Observer ERICH YAEGER

Location CHICAGO, IL Facility Type INDUSTRIAL

Point of emissions **Roadway/Tire Interface**

Vehicle Pass #	Seconds			Vehicle Type
	0	5	10	
1	0	0	0	LIGHT TRUCK
2	0	0	0	CAR
3	0	0	0	CAR
4	0	0	0	LIGHT TRUCK

Description of Road (Paved/Unpaved, Dry/Wet): PAVED, WET

Observer Signature

12/15/2014
Date

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: HORSEHEAD CORP.	Provide sketch of observer's position relative to the source:
Address: 2701 EAST 114TH ST. CHICAGO, IL 60617	BOTH DIRECTIONS
Facility ID: 031600AFV	WIND, N, TRUCK, 15 ft, Wind, North, Observer, Note: Not to Scale.
Date: 12/19/2014	
Location Description: ROAD TO IRM TRUCK LOADING	
Control Device: N/A	
Hours of Observation: 9:57 AM — 10:04 AM	
Observer's Name: ERICH YAEGER	
Certification Date of Observer: 9/25/2014	Observer's Affiliation: TRINITY CONSULTANTS
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**

CLOCK TIME 9:57	Initial 9:57 AM	Final 10:04 AM
OBSERVER LOCATION		
Distance to discharge	**15 ft**	**15 ft**
Direction from discharge	**90 degrees**	**90 degrees**
Height of observation point	**4 ft**	**4 ft**
BACKGROUND DESCRIPTION	TAN PROCESS EQT	SAME JB
WEATHER CONDITIONS		
Wind Direction	**From the S**	**From the S JB**
Wind Speed	0-5 mph	SAME mph
Ambient Temperature	45 F	SAME F
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	OVERCAST	SAME
PLUME DESCRIPTION		
Color	NO EMISSIONS	NO emissions JB
Distance Visible	N/A miles	N/A JB, miles
OTHER INFORMATION		

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start - End	Opacity (%) Sum	Opacity (%) Average
1	9:58 - 9:58	0	0
2	9:59 - 9:59	0	0
3	10:02 - 10:02	0	0
4	10:04 - 10:04	0	0

Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0%

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways (Cont.)

Company HORSEHEAD CORP. Observer ERICK YAEGER

Location CHICAGO, IL Facility Type INDUSTRIAL

Point of emissions **Roadway/Tire Interface**

Vehicle Pass #	Seconds			Vehicle Type
	0	5	10	
1	0	0	0	LIGHT TRUCK
2	0	0	0	HEAVY TRUCK
3	0	0	0	LIGHT TRUCK
4	0	0	0	HEAVY TRUCK

Description of Road (Paved/Unpaved, Dry/Wet): DAMP, PAVED

Observer Signature

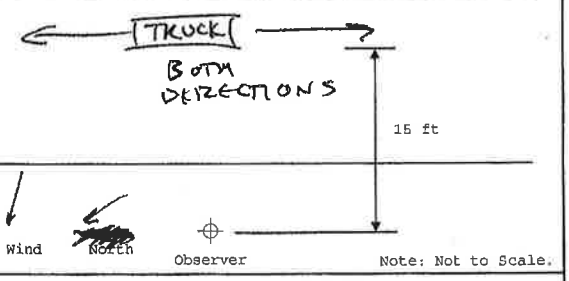
12/19/2019
Date

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways

Company: HORSEHEAD CORP.	Provide sketch of observer's position relative to the source:
Address: 2701 EAST 114TH ST. CHICAGO, IL 60617	
Facility ID: 031600AFV	
Date: 12/15/2014	
Location Description: FACILITY ENTRANCE (SECTION OF 114TH ST)	
Control Device: N/A	
Hours of Observation: 11:32 AM – 11:45 AM	
Observer's Name: ERICH YAEGER	
Certification Date of Observer: 9/25/2014	Observer's Affiliation: TRINITY CONSULTANTS
Point of Emissions: **Roadway/Tire Interface**	Height of Discharge Point: **0 ft**



CLOCK TIME	Initial	11:32 AM	Final	11:45 AM
OBSERVER LOCATION				
Distance to discharge	**15 ft**		**15 ft**	
Direction from discharge	**90 degrees**		**90 degrees**	
Height of observation point	**4 ft**		**4 ft**	
BACKGROUND DESCRIPTION	DENSE BRUSH (TAN)		SAME	
WEATHER CONDITIONS				
Wind Direction	**From the** S		**From the** S	
Wind Speed	5-10 **mph**		5-10 **mph**	
Ambient Temperature	45 **F**		45 **F**	
SKY CONDITIONS (e.g., clear, overcast, % clouds, etc.)	OVERCAST		OVERCAST	
PLUME DESCRIPTION				
Color	NO EMISSIONS		No emissions JB	
Distance Visible	[redacted] **miles** N/A		N/A JB **miles**	
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start – End	Opacity (%) Sum	Average
1	11:33 – 11:33	0	0
2	11:36 – 11:36	0	0
3	11:39 – 11:39	0	0
4	11:44 – 11:44	0	0

Readings ranged from 0 to 0 % opacity.

Average of 12 readings: 0%

40 CFR 60, App. A, Method 9

Method 9 Visual Emissions Observation Record Form

Paved and Unpaved Roadways (Cont.)

Company HORSEHEAD CORP. Observer ERICH YAEGER

Location CHICAGO, IL Facility Type INDUSTRIAL

Point of emissions **Roadway/Tire Interface**

Vehicle Pass #	Seconds			Vehicle Type
	0	5	10	
1	0	0	0	HEAVY TRUCK
2	0	0	0	HEAVY TRUCK
3	0	0	0	HEAVY TRUCK
4	0	0	0	HEAVY TRUCK

Description of Road (Paved/Unpaved, Dry/Wet): UNPAVED, WET

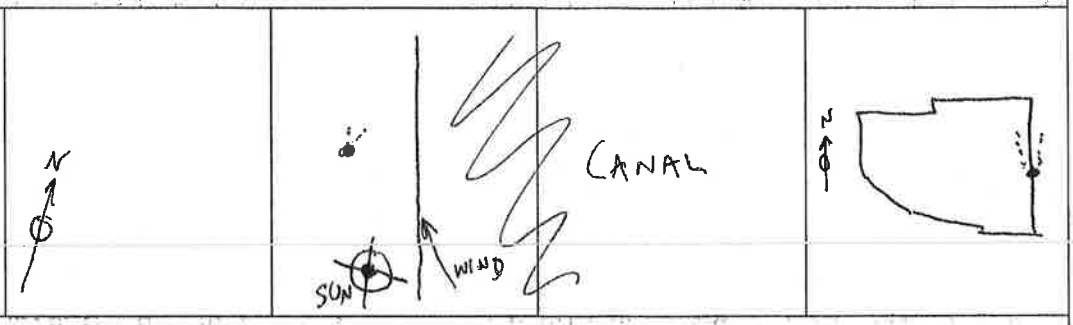
Observer Signature

12/19/2014
Date

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/19/2014
Sky Conditions OVERCAST	**Wind Direction** N/NW
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

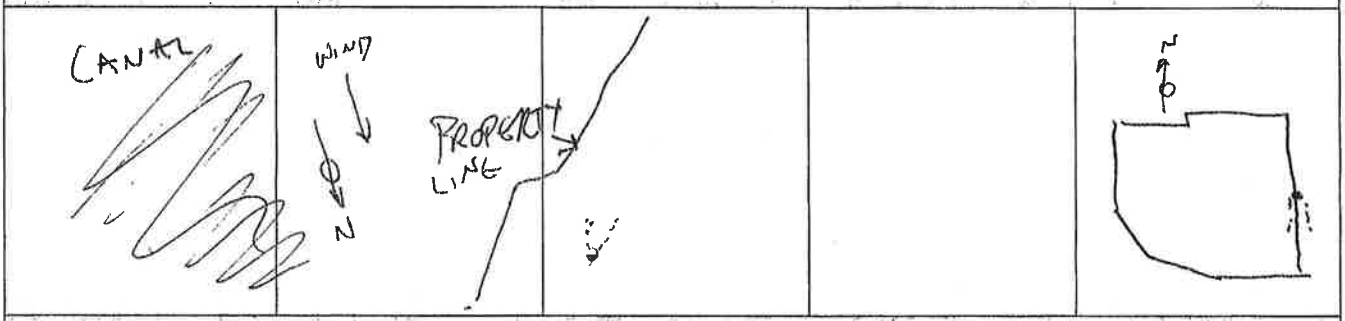
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	8:42 AM		
	"		00:00
	"		
	"		00:00
	"		
	"		00:00
	"		
	"		00:00
	"		
End Observation	8:52 AM		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/15/2014
Sky Conditions OVERCAST	**Wind Direction** N
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

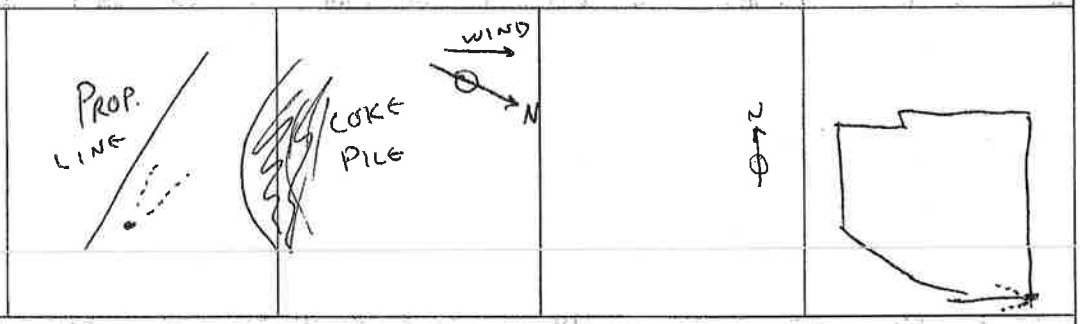
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	8:54 AM		
	—		00:00
	—		
	—		00:00
	—		
	—		00:00
	—		
	—		00:00
	—		
End Observation	9:04		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARIA	**Date** 12/19/2014
Sky Conditions OVERCAST	**Wind Direction** N/NW
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

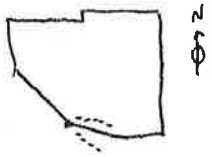
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	9:15 AM		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
End Observation	9:25 AM		00:00

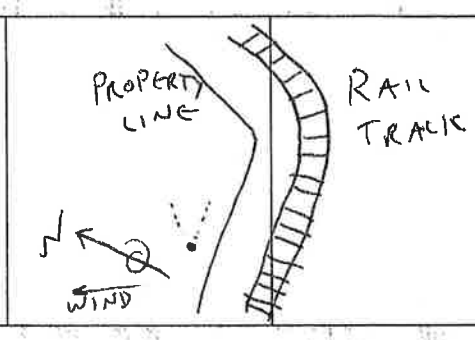
Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/15/2014
Sky Conditions OVERCAST	**Wind Direction** N/NW
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.





OBSERVATIONS

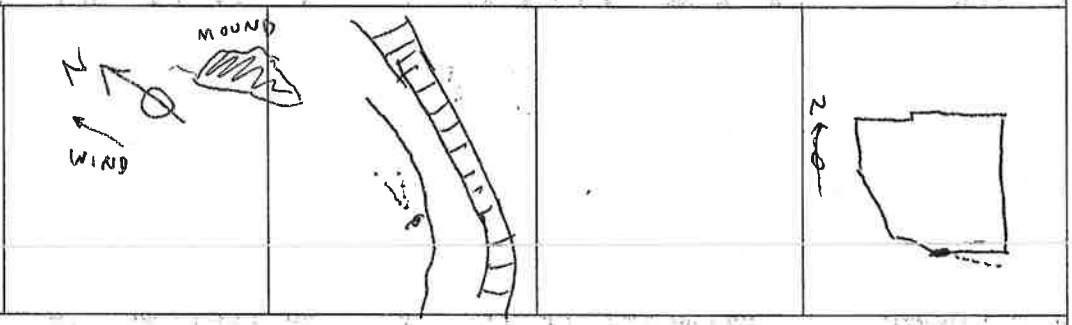
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	10:10 AM		
	"		00:00
	"		
	"		00:00
	"		
	"		00:00
	"		
	"		00:00
End Observation	10:20 AM		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/19/2014
Sky Conditions OVERCAST	**Wind Direction** N
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** [redacted] PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

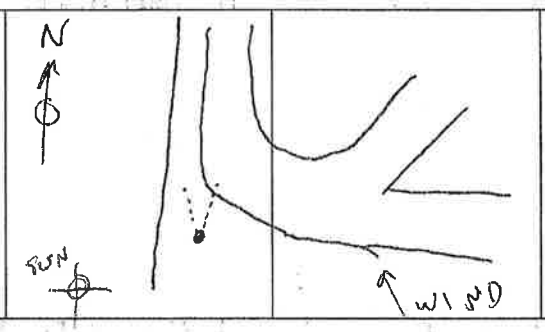
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	10:26		
	-		00:00
	-		
	-		00:00
	-		
	-		00:00
	-		
	-		00:00
	-		
End Observation	10:36		00:00

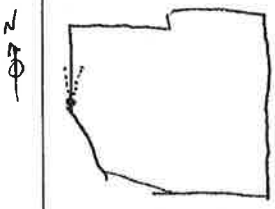
Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/15/2014
Sky Conditions OVERCAST	**Wind Direction** N/NW
Precipitation	**Wind Speed** 0 - 5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.





OBSERVATIONS

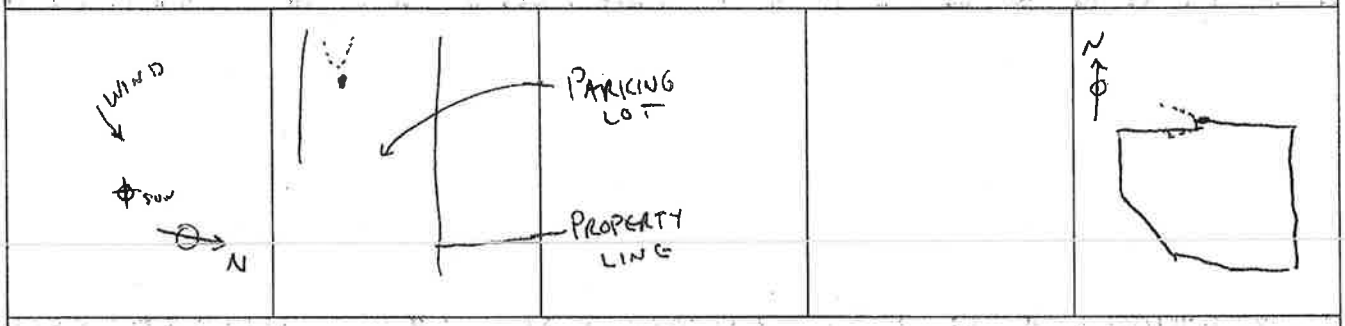
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	10:45 AM		
	-		00:00
	-		
	-		00:00
	-		
	-		00:00
	-		
	-		00:05
	-		
End Observation	10:55		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/15/2014
Sky Conditions OVERCAST	**Wind Direction** N/NE
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

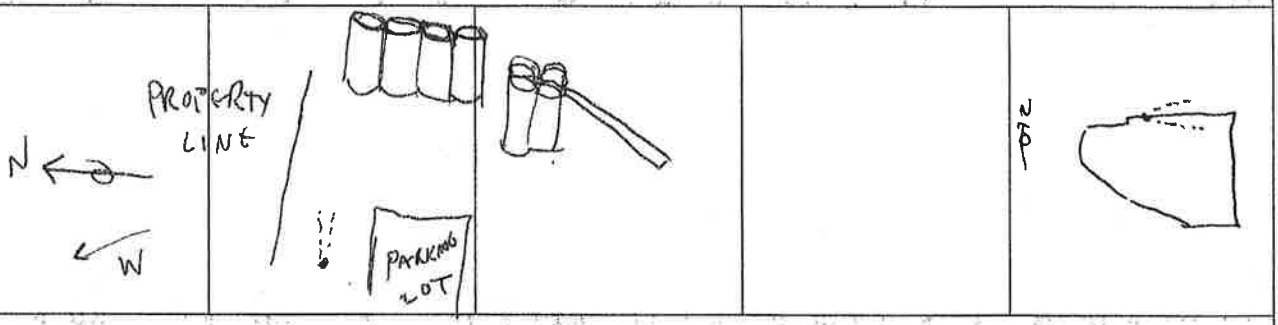
	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	11:04 AM		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
End Observation	11:14 AM		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0 %

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTSIDE LOCATION – METHOD 22

Company Horsehead Corporation (Chicago Plant)	**Observer** ERICH YAEGER
Location Chicago Plant, 2701 E. 114th St, Chicago, IL 60617	**Affiliation** TRINITY CONSULTANTS
Company Rep. JOHN MARTA	**Date** 12/15/2014
Sky Conditions OVERCAST (100%)	**Wind Direction** N/NW
Precipitation	**Wind Speed** 0-5 MPH
Industry Secondary Refining of Non Ferrous Metals	**Process Unit** PROPERTY LINE

Sketch Process Unit: Indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

	Clock Time	Observation Period Duration (min:sec)	Actual Emission Time (min:sec)
Begin Observation	11:18 AM		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
	–		00:00
	–		
End Observation	11:28 AM		00:00

Total Sample Time:	10:00
Total Emission Time:	00:00
Emission Frequency: (Total Emission Time/Total Sample Time) x 100%	0%

APPENDIX D: METEOROLOGICAL DATA

Horsehead Corporation - Chicago Plant
Weather and Windspeed Data - December 15, 2014

Date/Time	Record #	Average Wind Speed (mph)	Average Wind Direction	Gust (mph)	Temperature (°F)	Rain (inches)	Total Rain (inches)
12/15/2014 6:29	11278	6.307	195.1	11.95	45.85	0	0
12/15/2014 6:34	11279	4.267	184	7.778	45.88	0	0
12/15/2014 6:39	11280	5.727	182	9.56	45.85	0	0
12/15/2014 6:44	11281	5.985	179	10.16	45.72	0	0
12/15/2014 6:49	11282	5.419	181.1	11.35	45.67	0	0
12/15/2014 6:54	11283	7.992	180.4	13.14	45.66	0	0
12/15/2014 6:59	11284	5.991	180.1	9.56	45.66	0	0
12/15/2014 7:04	11285	5.836	177.3	10.76	45.65	0	0
12/15/2014 7:09	11286	7.849	175.8	13.14	45.48	0	0
12/15/2014 7:14	11287	7.635	172.9	11.35	45.45	0	0
12/15/2014 7:19	11288	7.254	180.7	13.14	45.45	0	0
12/15/2014 7:24	11289	9.08	180.9	16.12	45.44	0	0
12/15/2014 7:29	11290	7.397	182.7	11.35	45.44	0	0
12/15/2014 7:34	11291	6.628	184.5	11.95	45.42	0	0
12/15/2014 7:39	11292	7.284	176	11.35	45.44	0	0
12/15/2014 7:44	11293	8.52	180.9	12.54	45.43	0	0
12/15/2014 7:49	11294	7.623	190.8	13.73	45.44	0	0
12/15/2014 7:54	11295	5.896	181.4	10.16	45.44	0	0
12/15/2014 7:59	11296	7.313	178.8	12.54	45.44	0	0
12/15/2014 8:04	11297	8.18	179.3	11.95	45.44	0	0
12/15/2014 8:09	11298	9.64	191.4	14.93	45.44	0	0
12/15/2014 8:14	11299	6.348	186.9	10.76	45.45	0	0
12/15/2014 8:19	11300	5.483	188.3	8.97	45.47	0	0
12/15/2014 8:24	11301	6.146	186.1	11.35	45.48	0	0
12/15/2014 8:29	11302	7.212	194.7	12.54	45.49	0	0
12/15/2014 8:34	11303	5.788	188.1	9.56	45.47	0	0
12/15/2014 8:39	11304	7.117	197	14.33	45.48	0	0
12/15/2014 8:44	11305	7.045	195.2	13.14	45.45	0	0
12/15/2014 8:49	11306	7.748	191.4	15.52	45.55	0	0
12/15/2014 8:54	11307	7.921	185.5	13.14	45.59	0	0
12/15/2014 8:59	11308	7.742	177.3	13.73	45.54	0	0
12/15/2014 9:04	11309	6.176	166.9	8.37	45.45	0	0
12/15/2014 9:09	11310	7.2	175.8	11.95	45.45	0	0
12/15/2014 9:14	11311	8.94	174.3	13.73	45.38	0	0
12/15/2014 9:19	0	10.33	177.8	14.93	45.41	0	0
12/15/2014 9:24	1	7.29	176.3	13.14	45.45	0	0
12/15/2014 9:29	2	7.486	179.9	11.95	45.47	0	0
12/15/2014 9:34	3	9.65	178.9	16.12	45.54	0	0
12/15/2014 9:39	4	9.49	176.2	15.52	45.53	0	0
12/15/2014 9:44	5	7.957	181.4	12.54	45.57	0	0
12/15/2014 9:49	6	8.75	176.3	14.33	45.63	0	0
12/15/2014 9:54	7	8.46	178.8	13.14	45.67	0	0
12/15/2014 9:59	8	9.23	172.7	14.93	45.69	0	0
12/15/2014 10:04	9	9.84	179.4	16.12	45.87	0	0
12/15/2014 10:09	10	8.17	171.3	11.95	45.82	0	0
12/15/2014 10:14	11	7.778	168.6	11.35	45.74	0	0
12/15/2014 10:19	12	10.49	168.3	14.93	45.82	0	0
12/15/2014 10:24	13	9.58	173.9	16.71	46.05	0	0
12/15/2014 10:29	14	7.528	173.6	12.54	46.12	0	0
12/15/2014 10:34	15	9.87	175.6	13.73	46	0	0
12/15/2014 10:39	16	10.11	179.4	14.33	45.85	0	0
12/15/2014 10:44	17	11.37	174.3	15.52	45.6	0	0
12/15/2014 10:49	18	11.4	170.3	17.31	45.5	0	0
12/15/2014 10:54	19	12.02	174.6	17.9	45.48	0	0
12/15/2014 10:59	20	11.63	174	17.9	45.5	0	0
12/15/2014 11:04	21	11.78	180.2	18.5	45.52	0	0
12/15/2014 11:09	22	12.17	173.7	18.5	45.28	0	0
12/15/2014 11:14	23	9.83	176.9	15.52	45.32	0	0
12/15/2014 11:19	24	8.99	172.4	14.33	45.42	0	0
12/15/2014 11:24	25	9.02	172	15.52	45.46	0	0
12/15/2014 11:29	26	10.18	173	15.52	45.36	0	0

Horsehead Corporation - Chicago Plant
Weather and Windspeed Data - December 15, 2014

Date/Time	Record #	Average Wind Speed (mph)	Average Wind Direction	Gust (mph)	Temperature (°F)	Rain (inches)	Total Rain (inches)
12/15/2014 11:34	27	9.99	175.5	13.73	45.35	0	0
12/15/2014 11:39	28	8.53	152.1	13.14	45.22	0	0
12/15/2014 11:44	29	7.921	145	13.73	44.84	0	0
12/15/2014 11:49	30	7.528	178	11.95	44.83	0	0
12/15/2014 11:54	31	6.509	164.7	10.16	44.81	0	0
12/15/2014 11:59	32	9.48	142.1	14.33	44.43	0	0
12/15/2014 12:04	33	6.968	162.3	14.93	44.11	0	0
12/15/2014 12:09	34	6.503	171.2	10.76	43.96	0	0
12/15/2014 12:14	35	8.02	144.5	14.33	43.79	0	0
12/15/2014 12:19	36	7.373	162.1	15.52	43.49	0	0
12/15/2014 12:24	37	8.08	177.9	12.54	43.48	0	0
12/15/2014 12:29	38	7.409	174.7	11.35	43.47	0.01	0.01
12/15/2014 12:34	39	4.728	163.2	8.97	43.49	0	0.01
12/15/2014 12:39	40	7.546	156.5	12.54	43.51	0	0.01
12/15/2014 12:44	41	9.7	175.7	14.33	43.65	0	0.01
12/15/2014 12:49	42	8.32	185.7	11.35	43.78	0	0.01
12/15/2014 12:54	43	9.32	177.6	14.33	43.89	0	0.01
12/15/2014 12:59	44	8.92	180	14.33	43.97	0	0.01
12/15/2014 13:04	45	7.98	184.2	12.54	44.14	0	0.01
12/15/2014 13:09	46	9.83	177	14.33	44.28	0	0.01
12/15/2014 13:14	47	9.13	171.1	12.54	44.49	0	0.01
12/15/2014 13:19	48	7.921	172.2	14.33	44.62	0	0.01
12/15/2014 13:24	49	6.837	171.8	11.35	44.81	0	0.01
12/15/2014 13:29	50	8.46	179.2	14.93	44.93	0	0.01
12/15/2014 13:34	51	7.272	177.3	10.76	45.06	0	0.01
12/15/2014 13:39	52	7.635	181.2	13.14	45.29	0	0.01
12/15/2014 13:44	53	8.87	178.2	14.33	45.53	0	0.01
12/15/2014 13:49	54	8.76	177.7	12.54	45.74	0	0.01
12/15/2014 13:54	55	8.95	177.3	14.33	45.9	0	0.01
12/15/2014 13:59	56	7.689	182.6	14.93	46.1	0	0.01
12/15/2014 14:04	57	8.65	181.6	14.93	46.2	0	0.01
12/15/2014 14:09	58	7.76	178.7	12.54	46.33	0	0.01
12/15/2014 14:14	59	7.325	178	12.54	46.31	0	0.01
12/15/2014 14:19	60	11.36	172.3	16.71	46.12	0	0.01
12/15/2014 14:24	61	10.89	174.1	17.31	46.11	0	0.01
12/15/2014 14:29	62	7.349	174.6	13.73	46.12	0	0.01

Horsehead Corporation - Chicago Plant
Weather and Windspeed Data - December 19, 2014

Date/Time	Record #	Average Wind Speed (mph)	Average Wind Direction	Gust (mph)	Temperature (°F)	Rain (inches)	Total Rain (inches)
12/19/2014 6:29	1118	4.508	302.5	6.587	29.49	0	0
12/19/2014 6:34	1119	4.013	300.6	6.587	29.63	0	0
12/19/2014 6:39	1120	3.579	291.1	4.8	29.63	0	0
12/19/2014 6:44	1121	3.328	297.7	4.8	29.63	0	0
12/19/2014 6:49	1122	3.43	292.1	4.8	29.63	0	0
12/19/2014 6:54	1123	3.68	292.4	5.395	29.63	0	0
12/19/2014 6:59	1124	3.352	278.8	5.395	29.7	0	0
12/19/2014 7:04	1125	3.799	281	4.8	29.66	0	0
12/19/2014 7:09	1126	3.942	305.8	5.991	29.83	0	0
12/19/2014 7:14	1127	4.728	286.3	7.182	29.95	0	0
12/19/2014 7:19	1128	4.079	289	5.395	29.96	0	0
12/19/2014 7:24	1129	5.02	303.8	6.587	30.03	0	0
12/19/2014 7:29	1130	5.884	310.5	7.778	30.13	0	0
12/19/2014 7:34	1131	4.746	304.9	6.587	30.26	0	0
12/19/2014 7:39	1132	3.751	301.6	5.991	30.28	0	0
12/19/2014 7:44	1133	3.683	284.7	4.8	30.22	0	0
12/19/2014 7:49	1134	3.489	292.6	5.991	30.19	0	0
12/19/2014 7:54	1135	5.217	309.3	6.587	30.28	0	0
12/19/2014 7:59	1136	4.299	299.7	5.991	30.3	0	0
12/19/2014 8:04	1137	3.531	291.6	4.8	30.29	0	0
12/19/2014 8:09	1138	3.99	295.7	5.395	30.28	0	0
12/19/2014 8:14	1139	4.067	301.5	7.182	30.41	0	0
12/19/2014 8:19	1140	5.086	308.9	6.587	30.46	0	0
12/19/2014 8:24	1141	4.651	306.6	5.991	30.5	0	0
12/19/2014 8:29	1142	4.74	305.1	6.587	30.5	0	0
12/19/2014 8:34	1143	4.966	307.7	5.991	30.5	0	0
12/19/2014 8:39	1144	4.812	308.3	6.587	30.5	0	0
12/19/2014 8:44	1145	5.199	309.9	7.182	30.51	0	0
12/19/2014 8:49	1146	5.199	308.4	6.587	30.5	0	0
12/19/2014 8:54	1147	5.014	309.8	6.587	30.53	0	0
12/19/2014 8:59	1148	4.806	307.3	5.991	30.54	0	0
12/19/2014 9:04	1149	4.573	302.1	5.991	30.66	0	0
12/19/2014 9:09	1150	4.097	294	5.991	30.76	0	0
12/19/2014 9:14	1151	4.156	305.5	5.991	30.92	0	0
12/19/2014 9:19	1152	4.043	289.5	5.395	30.93	0	0
12/19/2014 9:24	1153	3.686	288.8	4.8	30.94	0	0
12/19/2014 9:29	1154	4.377	277	5.395	30.94	0	0
12/19/2014 9:34	1155	4.448	278.7	5.991	30.94	0	0
12/19/2014 9:39	1156	4.216	267.7	4.8	30.94	0	0
12/19/2014 9:44	1157	2.927	232.6	4.204	31.02	0	0
12/19/2014 9:49	1158	3.688	252.3	5.395	31.1	0	0
12/19/2014 9:54	1159	3.275	266.4	4.204	31.17	0	0
12/19/2014 9:59	1160	3.757	277.2	5.395	31.29	0	0
12/19/2014 10:04	1161	3.185	272.5	5.395	31.37	0	0
12/19/2014 10:09	1162	3.077	261.6	5.395	31.29	0	0
12/19/2014 10:14	1163	3.298	262	4.8	31.33	0	0
12/19/2014 10:19	1164	3.077	294.3	4.8	31.37	0	0
12/19/2014 10:24	1165	3.406	287.6	4.204	31.37	0	0
12/19/2014 10:29	1166	3.858	281.6	4.8	31.32	0	0
12/19/2014 10:34	1167	3.888	279.5	4.8	31.24	0	0
12/19/2014 10:39	1168	3.435	280.5	4.8	31.3	0	0
12/19/2014 10:44	1169	3.626	295.9	4.8	31.37	0	0
12/19/2014 10:49	1170	3.344	296.6	4.8	31.37	0	0
12/19/2014 10:54	1171	4.335	305.4	6.587	31.37	0	0
12/19/2014 10:59	1172	4.079	300	6.587	31.37	0	0
12/19/2014 11:04	1173	4.001	298.7	5.395	31.38	0	0
12/19/2014 11:09	1174	4.246	291.7	5.991	31.4	0	0
12/19/2014 11:14	1175	4.133	299.3	5.395	31.39	0	0
12/19/2014 11:19	1176	3.71	296.5	5.395	31.47	0	0
12/19/2014 11:24	1177	4.675	301.4	5.991	31.39	0	0
12/19/2014 11:29	1178	4.996	307.9	6.587	31.38	0	0
12/19/2014 11:34	1179	4.585	301.9	5.991	31.45	0	0

EXHIBIT C

Stormwater Berm Photographs
Horsehead Corporation - Chicago Plant

Photo looking north – showing earthen berm south of silo storage area (Calumet River is in center of the photo, Horsehead silos in upper left portion of photo)

Photo looking north – showing paved berm alongside silos (Calumet River is in right portion of photo, ice covered, Horsehead silos in upper left portion of photo)

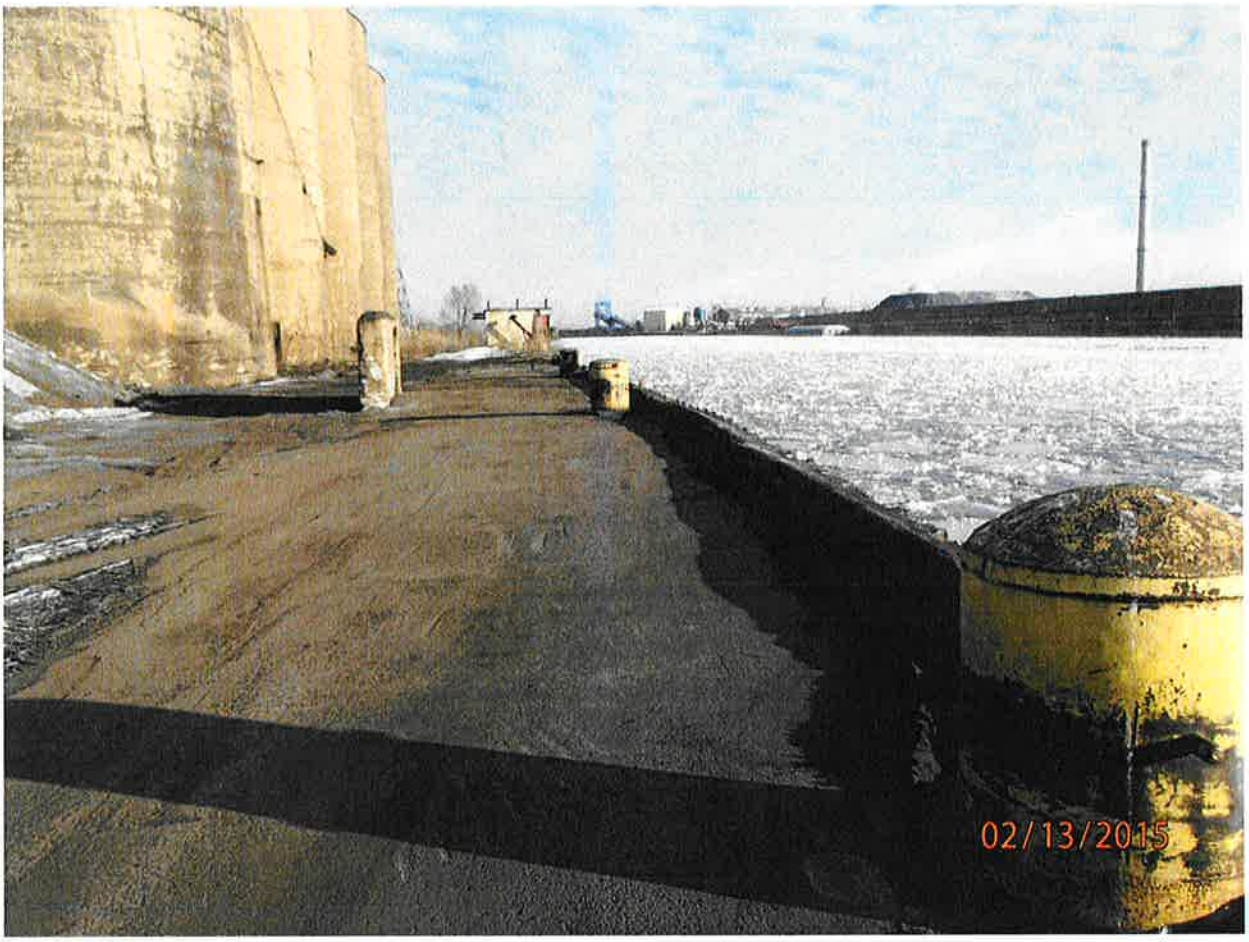


EXHIBIT D

Master Site Diagram with Berms and Stormwater Drainage
Horsehead Corporation - Chicago Plant

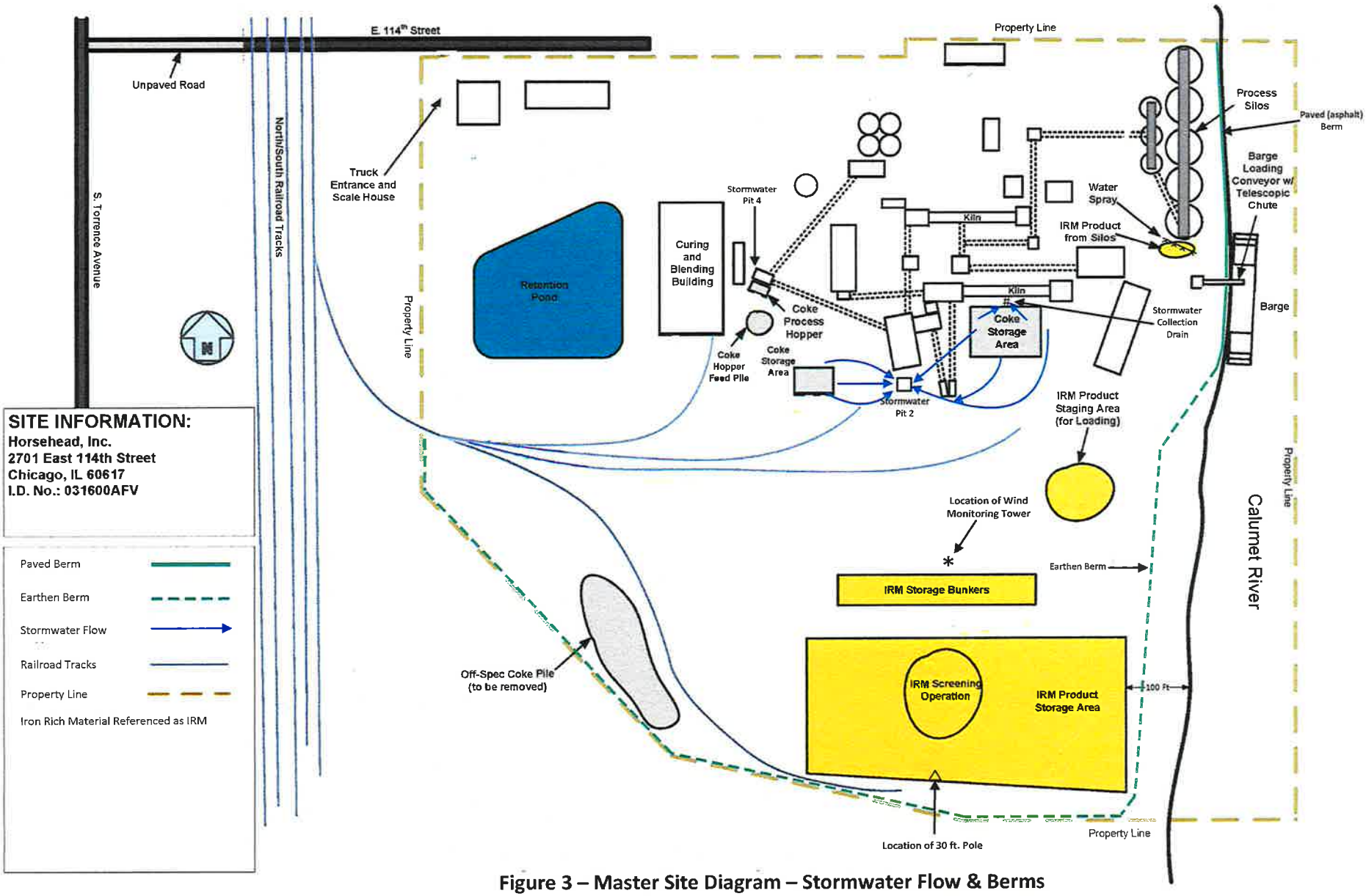


Figure 3 – Master Site Diagram – Stormwater Flow & Berms

EXHIBIT E

IRM Study Abstract - Passive Removal of Containments Using Iron Rich Material (IRM) Horsehead Corporation - Chicago Plant

U.S. EPA Contaminated Site Cleanup Information (CLU-IN)

Search Result

LOW-COST, LONG-TERM PASSIVE TREATMENT OF METAL-BEARING AND ARD WATER USING IRON RICH MATERIAL
Brown, A. International Mine Water Association, 2013 Annual Conference, Golden, CO: Reliable Mine Water Technology, Vol I: 525-532, 2013

An iron-rich material (IRM) can be used for inexpensive and passive removal of divalent metal contaminants from acid- and metal-bearing mine drainage. IRM, the cinder residue resulting from zinc recovery from electric arc furnace dust in a horizontal Waelz furnace, occurs as a solid solution of iron oxides and akermanite that is high in alkalinity, cation exchange capacity, adsorptive capacity, porosity, surface area, strength, and permeability. IRM is marketed in the United States as HiSorb and Ecotite™. This paper describes the chemistry, action, capabilities, performance, and design of IRM water treatment systems. The author briefly describes the use of IRM for the OU2 Cinder Bank water treatment at the Palmerton Zinc Superfund site. http://www.imwa.info/docs/imwa_2013/IMWA2013_Brown_568.pdf

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