

**BRAD SUTEK**

*Plant Manager*

2701 E. 114<sup>TH</sup>

STREET

CHICAGO, IL 60617

WWW.AZR.COM

BSUTEK@AZR.COM

P 773-933-9263

F 773-933-9272



**Via E-Mail**

June 12, 2018

Julie Morita, M.D.  
Commissioner  
Department of Public Health and Safety of Chicago  
333 South State St., Room 200  
Chicago, IL 60604

RE: Supplemental Materials – Request for Variance from the Rules and Regulations for Control of Emissions from the Handling and Storage of Bulk Solid Materials – American Zinc Recycling

Dear Commissioner Morita:

Pursuant to Section 8.0 of Article II, Part E of the City of Chicago Department of Public Health's Rules and Regulations for Control of Emissions from the Handling and Storage of Bulk Solid Materials (the "Bulk Solid Materials Rules" or "Rules"), American Zinc Recycling ("AZR"), formerly Horsehead Corporation, submitted a request for variance relief from certain of the requirements of the Rules.<sup>1</sup> The empirical PM<sub>10</sub> monitoring data and related information included in this correspondence supplements the existing AZR pending variance request concerning Sections 3.0(4)(a) through (e), or the portion of the Rules describing installation and monitoring of four (4) PM<sub>10</sub> monitors with data logging.

As previously described to the City of Chicago Department of Public Health (CDPH), the bulk solid materials handling and transport which are conducted by AZR's Chicago Plant, located at 2701 E 114<sup>th</sup> Street, do not warrant the imposition of continuous PM<sub>10</sub> monitoring at its facility boundaries. The limited quantity and high moisture content of AZR's petcoke/metcoke material, which will be entirely enclosed within a building,<sup>2</sup> and the density and "crusting" characteristics of its outdoor IRM storage and handling operations, do not present any significant risk of exceeding acceptable levels of PM<sub>10</sub> emissions, and do not warrant the imposition of continuous PM<sub>10</sub> monitoring at its facility boundaries. AZR's opacity test results, as provided to the CDPH per previous submittals, and subsequent opacity testing results, continue to provide objective data confirming that the risk of unacceptable fugitive dust emissions from AZR's Chicago Plant operation is either nonexistent or extremely low.

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<sup>1</sup> June 13, 2014, Correspondence from John Marta, Horsehead Corporation, to Ms. Bechara Choucair, Commissioner, Chicago Department of Public Health. Subsequent submittals from Horsehead Corporation / AZR dated February 19, 2015, September 25, 2015, and February 9, 2017.

<sup>2</sup> February 9, 2017, Correspondence from Brad Sutek, AZR, to Ms. Julie Morita, Commissioner, Chicago Department of Public Health.

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In this submittal, AZR is amending the record for the pending variance request regarding the installation and monitoring of 4 PM<sub>10</sub> monitors with a discussion of PM<sub>10</sub> concentration data collected from monitors in the vicinity of AZR's Rockwood, Tennessee facility (Rockwood Plant). As we describe below, the AZR Rockwood Plant is operationally comparable to AZR's Chicago Plant, located in a reasonably isolated location, and without other large stationary sources of PM<sub>10</sub> located nearby. Therefore, PM<sub>10</sub> concentration data collected near the Rockwood Plant is representative of PM<sub>10</sub> impacts from the similar operations conducted at the Chicago Plant.

### **AZR ROCKWOOD PLANT AND AZR CHICAGO PLANT ARE COMPARABLE FACILITIES**

While the geographic layout of the Rockwood Plant and the Chicago Plant is different, dictated by the physical constraints and geography of the two locations (see Figure 1 for an aerial view of the Rockwood Plant and; Figure 2 for an aerial view of the Chicago Plant provided on the following pages), the operations and subsequent emissions at both facilities are similar in that each has two rotary kilns that produce Waelz Oxide as the principal product, and IRM as a by-product. Just like at the Chicago Plant, all raw material and Waelz Oxide handling at the Rockwood Plant is conducted within a building controlled by dust collection equipment. Each facility stores the IRM from the kilns in outdoor storage piles, with IRM storage and handling concentrated at the northern quadrant of the Rockwood Plant, while at the Chicago Plant most IRM storage and handling occurs at the southern quadrant.<sup>3</sup> Each facility conducts IRM sizing activities outdoors (screening and crushing) after spraying the material surface with water to minimize fugitive particulate emissions. Finally, each facility uses a front end loader to remove IRM material from piles and load it onto conveyors for shipment to customers via rail, or into trucks. The Chicago Plant also ships IRM via barge, using covered conveyors, a telescopic discharge chute, and wet suppression.

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<sup>3</sup> At the Chicago Plant, IRM is also stored in enclosed storage silos; however, unlike the Chicago Plant, there are no IRM storage silos at the Rockwood Plant; all IRM at the Rockwood Plant is stored outdoors.

**Figure 1. AZR Rockwood Plant**





Additional details are provided in the following tables comparing AZR Rockwood Plant and AZR Chicago Plant capacity, sources, controls, and permitted emissions to demonstrate that the operations at the two AZR facilities are reasonably comparable, particularly with respect to the nature and volume of their IRM operations.

**Table 1. AZR Rockwood Pant and AZR Chicago Plant Capacity Comparison**

Process Stream	Rockwood Plant Capacity	Chicago Plant Capacity
<b>Raw Material Input</b> (tons per hour) (tons per year)	36 (Kiln #1 + Kiln #2) 315,360	35 (Kiln #1 + Kiln #2) 286,459 limited by permit hours
<b>Waelz Oxide (CZO) Product Output</b> (tons per hour) (tons per year)	9.4 (Kiln #1 + Kiln #2) 82,344	12.5 (Kiln #1 + Kiln #2) 102,600
<b>IRM Output</b> (tons per hour) (tons per year)	15.7 (Kiln #1 + Kiln #2) 137,532	19.2 (Kiln #1 + Kiln #2) 157,800
<b>IRM Screening/Crushing</b> (tons per hour)	200 (daily average in permit)	Approximately 45 (from annual limit in permit)
<b>IRM Outdoor Storage</b> (tons)	118,721 (estimated <sup>4</sup> )	76,000

**Table 2. AZR Rockwood Plant and AZR Chicago Plant IRM Emission Source and Control Descriptions<sup>5</sup>**

Rockwood Plant		Chicago Plant	
Sources	Controls	Sources	Controls
Kiln discharge cooler and conveyor (IRM)	Hood and baghouse	Kiln discharge cooler and conveyor (IRM)	Hood and baghouse
---	---	IRM Process silos	Indoors
IRM Cooler(s)	Dust collector	IRM Cooler(s)	Wet suppression
IRM Outdoor storage piles	Wet suppression	IRM Outdoor storage piles	Wet suppression
IRM Handling with Front end loader	Wet suppression	IRM Handling with Front end loader	Wet suppression
IRM Screen	Wet suppression	IRM Screen	Wet suppression
IRM Crusher	Wet Suppression Indoors	IRM Crusher	Wet suppression
---	---	IRM Load out to Barge	Wet suppression, Covered conveyors, Telescopic chute
IRM Load out to truck, railcar	Wet suppression	IRM Load out to railcar	Wet suppression, Covered conveyor
		IRM Load out to truck	Wet suppression

<sup>4</sup> Based on measurements from GoogleEarth and 30 foot height assumption.

<sup>5</sup> Information gathered from the following documents: Consolidated Fugitive Dust Control Plan and Operating Program for Fugitive Particulate Matter for Horsehead Corporation (Chicago Plant), 1/29/15; Rockwood Plant Operating Permit (Title V) #562547 issued 1/31/18; Chicago Plant Clean Air Act Permit Program (CAAPP) Permit #96030189 issued 5/11/17; Rockwood Emissions 2012 CERR-TRI.xls

**Table 3. AZR Rockwood Plant and AZR Chicago Plant Comparison – Allowable Emission Rates**

<b>Emission Source</b>	<b>Rockwood Plant Allowable PM Emission Rate (tons per year)<sup>6</sup></b>	<b>Rockwood Plant Title V Permit Condition ID</b>	<b>Chicago Plant Allowable PM Emission Rate (tons per year)</b>	<b>Chicago Plant CAAPP Permit Condition ID</b>
<b>Outdoor Storage, Sizing, Handling</b>	4.38	E6-2	1.1	4.6.1
<b>IRM Discharge, Cooler, Handling</b>	10.95	E8-2	9.8	4.1.1; Application pending with IEPA
<b>Kiln #1</b>	16.81	E10-7	10.0	4.2.1
<b>Kiln #2</b>	43.36	E11-5	11.5	4.2.1

Considering this information, the Rockwood Plant is a comparable facility to the Chicago Plant, both in terms of operations and operating capacity, with the Chicago Plant overall having more stringent PM<sub>10</sub> emission limits than those established for the Rockwood Plant.

### **PM<sub>10</sub> MONITORING DATA COLLECTED NEAR THE ROCKWOOD PLANT**

Two PM<sub>10</sub> monitors are required to be operated and maintained by AZR in the vicinity of the Rockwood Plant, as described in the Title V air permit issued to AZR, as shown in Table 4:<sup>7</sup>

**Table 4. PM<sub>10</sub> Monitors Near the AZR Rockwood Plant**

<b>Site #</b>	<b>AIRS Site #</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>
1	47-145-0104	Rockwood High School	+35.873152	-84.689646
2	47-145-0103	Clymersville Road Co-Located Site	+35.868153	-84.698258

These two locations, referred to as the High School monitor (AIRS Site # 47-145-0104) and the Clymersville Road monitor (AIRs Site # 47-145-0103) have been previously maintained by the Tennessee Department of Environmental Conservation, and have a longstanding record of PM<sub>10</sub> monitored concentrations, extending back to 1992.<sup>8</sup>

As shown in Figure 3, the High School monitor is located approximately 2,000 feet northeast from the center of the Rockwood Plant (the location of the kilns), and approximately 1,000 feet to the northeast of the closest approach of the Rockwood Plant property boundary. The main IRM outdoor storage and handling operation location is approximately 1,500 feet due west of the High School monitor location. The Clymersville Road Monitor is located approximately 1,000 feet southwest from the center of the Rockwood Plant (the location of the kilns), and approximately 300 feet to the southwest of the closest approach of the Rockwood Plant property boundary. Unlike the Rockwood Plant, the Chicago Plant is

<sup>6</sup> Lb/hr permit limits in Title V permit multiplied by 8,760 hours/year, and divided by 2,000 Lb/ton, to convert to tons per year as shown in Table.

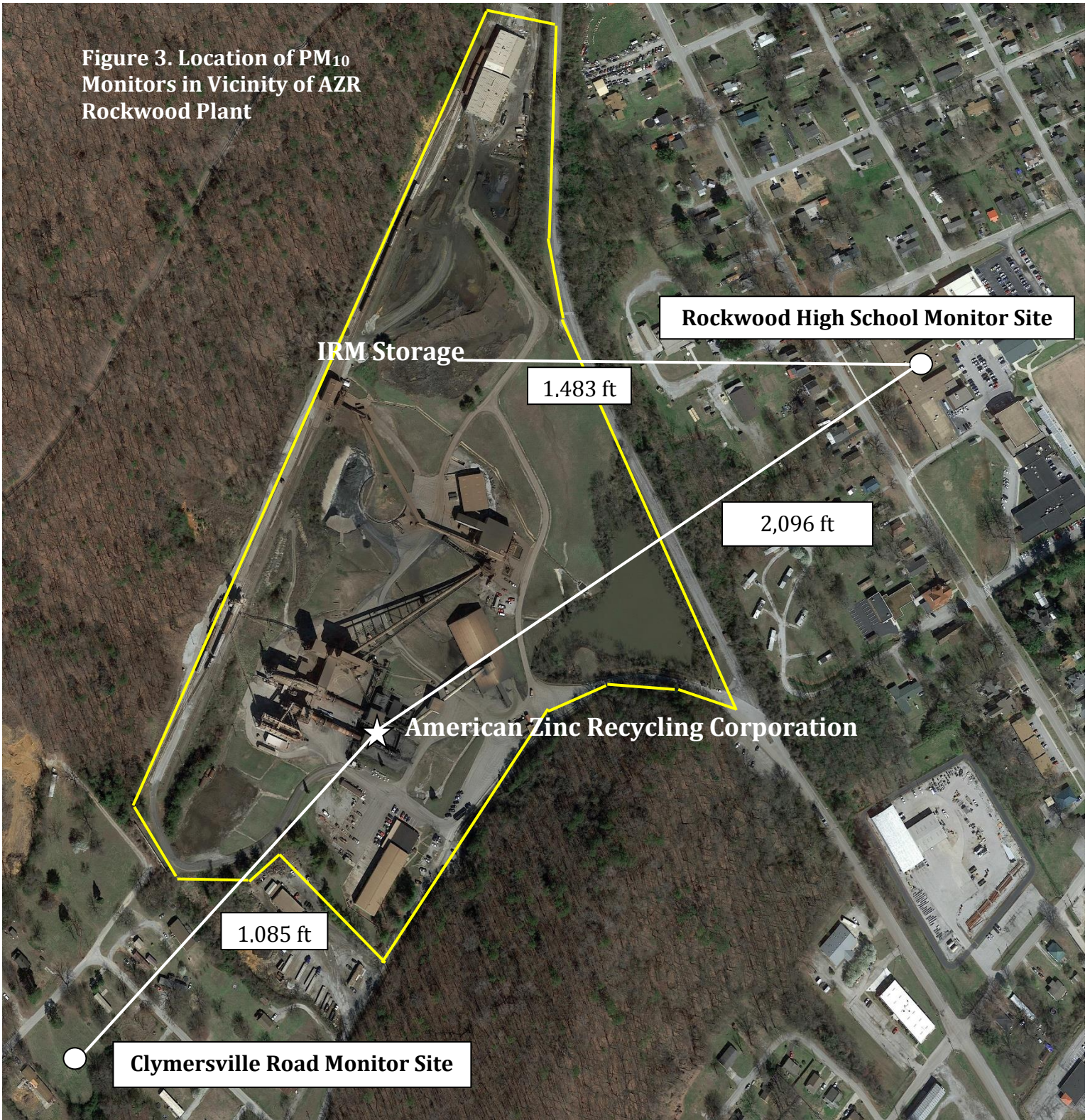
<sup>7</sup> Rockwood Plant Operating Permit (Title V) #562547 issued 1/31/18, Condition E3-10.

<sup>8</sup>

<https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=5f239fd3e72f424f98ef3d5def547eb5&extent=-146.2334,13.1913,-46.3896,56.5319>

not located in this close of a proximity to a school or any other place where either children or adults would gather.

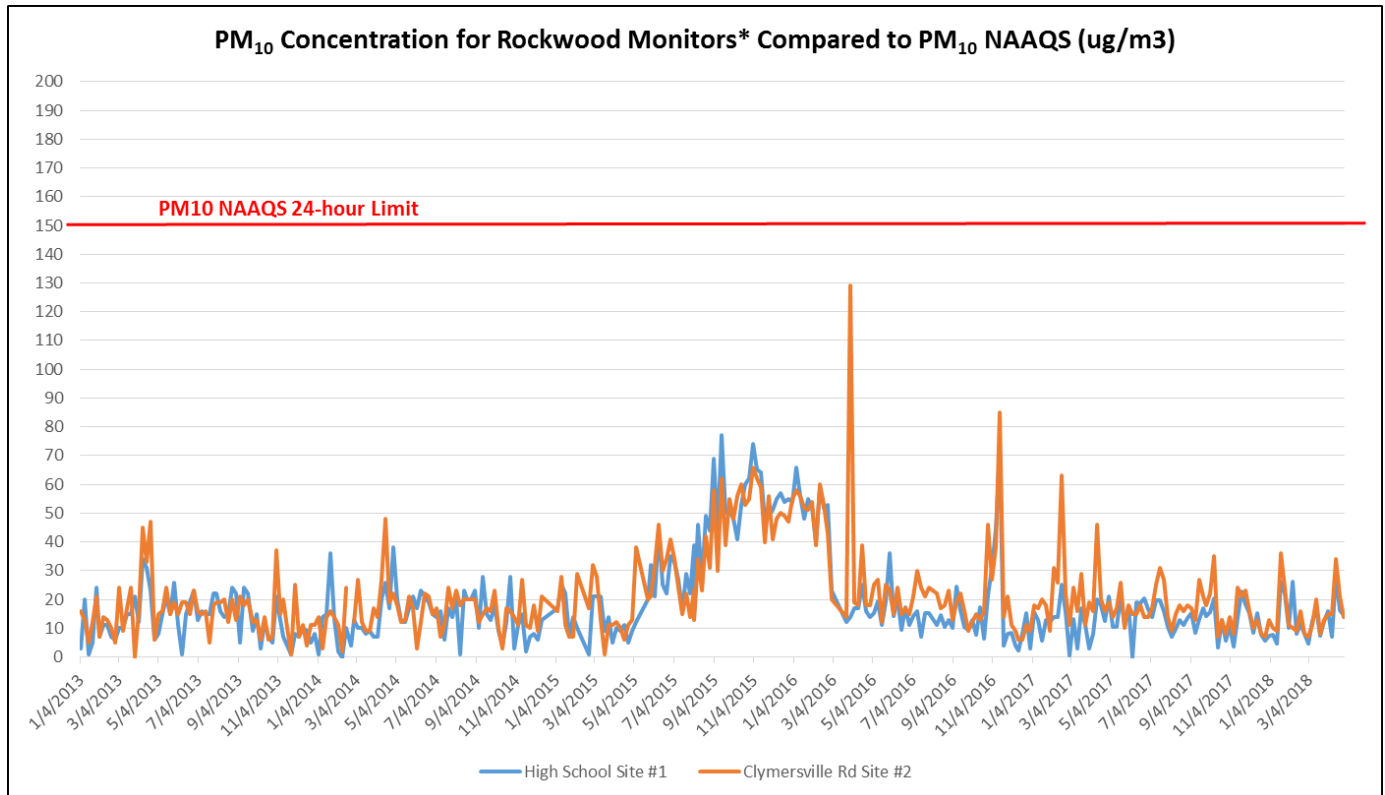
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A graphical analysis of the monitored PM<sub>10</sub> concentrations from the two monitors in the vicinity of the AZR Rockwood Plant show a very clear history of low PM<sub>10</sub> concentrations, well below the 150 microgram per cubic meter (µg/m<sup>3</sup>) National Ambient Air Quality Standard (NAAQS) for 24-hour PM<sub>10</sub> concentrations.<sup>9</sup>

**Figure 4. PM<sub>10</sub> Monitored Concentrations (6-day averages) in the Vicinity of the AZR Rockwood Plant**



\* Individual data values represent a 6-day average sample.

The data from the two monitors near the AZR Rockwood Plant shown in Figure 4 can be summarized by the average and the maximum PM<sub>10</sub> concentrations during 2013 – April, 2018 as provided in Table 5. Average PM<sub>10</sub> monitored concentrations are low: averaging about 15% of the 24-hour NAAQS for PM<sub>10</sub> on a long term average basis. Even the highest short-term PM<sub>10</sub> concentration, from a multi-year period of monitoring data, is only slightly above 50% of the 24-hour PM<sub>10</sub> NAAQS. This data shows that impacts from PM<sub>10</sub> emissions from the AZR Rockwood Plant are only a very small fraction of the PM<sub>10</sub> NAAQS.

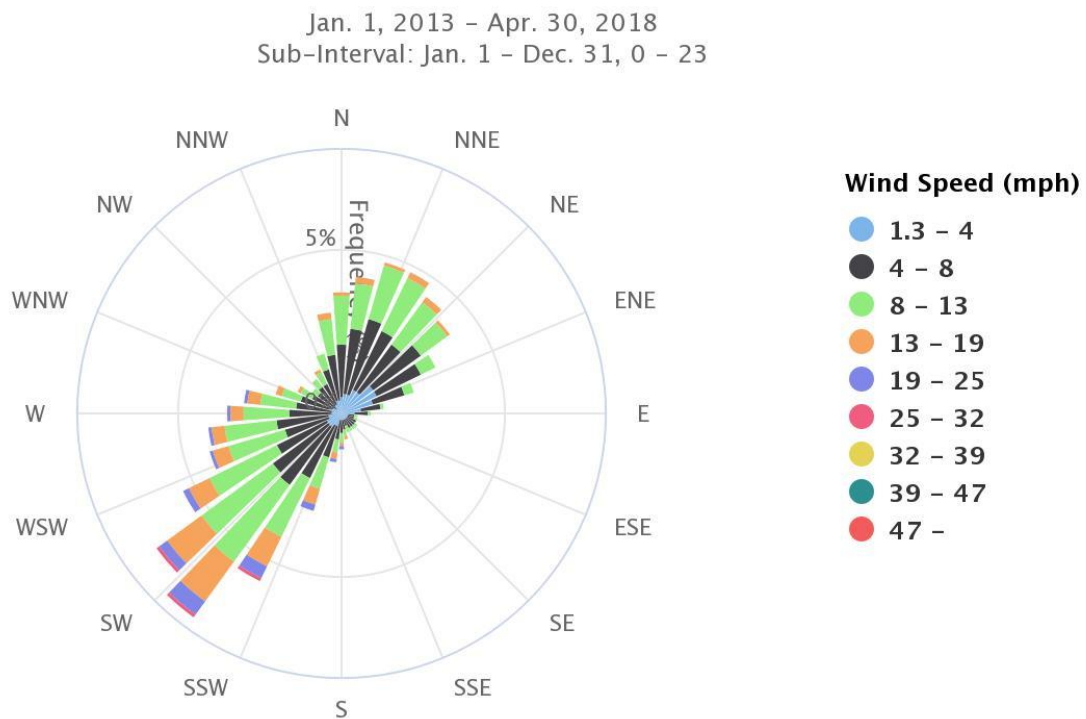
<sup>9</sup> The noticeable spike in monitored PM<sub>10</sub> concentrations at both monitors near the AZR Rockwood Plant in Fall 2016 can be attributed to nearby wildfires. Further, another spike at the Clymersville Road monitor in March of 2016 is suspected of being a typographical error based on a visual review of the filter from that monitor which did not display an atypically high amount of particulate matter.  
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**Table 5. Summary of PM<sub>10</sub> Data<sup>10</sup>**

<b>Data Description</b>	<b>High School Monitor (ug/m<sup>3</sup>)</b>	<b>Clymersville Road Monitor (ug/m<sup>3</sup>)</b>
Average PM <sub>10</sub> Concentration (considering all data)	19	22
Highest PM <sub>10</sub> Concentration – Any Data Period	77	129

We also reviewed the PM<sub>10</sub> monitor data in the vicinity of the AZR Rockwood Plant given that the High School Monitor and the Clymersville Road Monitor essentially become upwind and downwind monitors, with the AZR Rockwood Plant in between, when the wind blows from either the northeast or southwest wind directions. Considering that the prevailing wind direction at the AZR Rockwood Plant, as shown in the Figure 5 wind rose, is from the southwest, the two monitors near the AZR Rockwood Plant are appropriately positioned, considering the prevailing southwest wind: the Clymersville Road monitor acts as a upwind monitor of the AZR Rockwood Plant, and the High School Monitor acts as a downwind monitor of the AZR Rockwood Plant.

**Figure 5 – Prevailing Wind Direction at AZR Rockwood Plant**  
**KNOXVILLE MCGHEE TYSON AP (TN) Wind Rose**



Given the PM<sub>10</sub> monitor placement near the AZR Rockwood Plant, when the wind is blowing out of the southwest, if AZR’s emissions (from operations, IRM storage, and IRM material handling) were impacting the PM<sub>10</sub> ambient concentration at the High School monitor, we would expect this downwind monitor to record a higher PM<sub>10</sub> concentration than the Clymersville Road monitor, which would be

<sup>10</sup> Considering individual 6-day average sample data.  
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upwind of the AZR Rockwood Plant (in the southwest wind scenario). Likewise, winds out of the northeast will pass over the AZR Rockwood Plant and IRM storage toward the Clymersville Road monitor (the downwind monitor), with the High School monitor acting as an upwind monitor in this northeast wind scenario.

PM<sub>10</sub> monitor data is available in a format such that a data point is available for every sixth day during the time period of January, 2013 through the end of April, 2018. To analyze the possible impact of the AZR Rockwood Plant, we reviewed the monitored concentration differential between the High School monitor concentration and the Clymersville Road monitor concentration, given that PM<sub>10</sub> data was available from the same corresponding periods at each monitor. The highest differentials would be of particular interest; those periods, along with the corresponding wind direction during the period, could be used to determine if the AZR Rockwood Plant was a potential contributor of the PM<sub>10</sub> monitored concentration differential. Table 6 shows the highest differentials between the High School monitor and the Clymersville Road monitor over the period of the PM<sub>10</sub> concentration data from January 2013 through April 2018.

**Table 6 – High Monitored Differential Periods – High School Monitor and Clymersville Road Monitor**

High Differential Period Dates (6-day averages)	PM <sub>10</sub> Differential - Difference between High School Monitor (Site #1) and Clymersville Road Monitor (Site #2) Data (ug/m3)*	Daily Mean Wind Speed (Mph) <sup>11</sup>	Daily Mean Wind Direction	6-day Mean Wind Speed (mph) <sup>12</sup>	6-day Mean Wind Direction <sup>13</sup>
4/17/2013 - 4/22/2013	-24	3.80	SSE	7.52	SSE
6/4/2013 - 6/9/2013	-18	3.80	ESE	4.28	ESE
3/1/2014 - 3/6/2014	-17	6.30	E	7.65	SSE
4/12/2014 - 4/17/2014	-22	2.40	WSW	8.63	SSW
8/4/2014 - 8/9/2014	17	3.70	ENE	4.27	SSE
1/31/2015 - 2/5/2015	-19	8.60	WSW	6.13	SSW
5/1/2015 - 5/6/2015	-26	3.60	ENE	3.1	SSE
3/26/2016 - 3/31/2016	-115	11	WSW	6.8	S
10/22/2016 - 10/27/2016	-25	3	ESE	4.7	ESE
2/13/2017 - 2/18/2017	-38	5	SW	6.5	W
2/2/2018 - 2/7/2018	16	5.5	N	5.7	E

\* A negative value indicates that the Clymersville Road monitor had a higher PM<sub>10</sub> concentration than the High School monitor; a positive value indicates that the High School monitor had a higher PM<sub>10</sub> concentration than the Clymersville Road monitor.

<sup>11</sup> Meteorological data obtained from Midwest Regional Climate Center cli-MATE Database; <http://mrcc.isws.illinois.edu/CLIMATE>. Daily observed data for wind speed and sub-hourly observed data for wind direction from the Knoxville, TN station ID 13891 (East and slightly North of Rockwood, TN)

<sup>12</sup> The 6-day Mean Wind Speed was determined by averaging all wind direction data reported for the two days with the greatest differential in PM<sub>10</sub> concentration between the two monitors and the previous five days.

<sup>13</sup> The 6-day Mean Wind Direction was determined by averaging all wind direction data reported for the two days with the greatest differential in PM<sub>10</sub> concentration between the two monitors and the previous five days and converting the degree value to a direction value.

## OBSERVATIONS FROM MONITOR DIFFERENTIAL ANALYSIS

1. When winds are out of a southwesterly direction, if the AZR Rockwood Plant PM<sub>10</sub> emissions were consequential to monitored values, the Clymersville Road monitor would not be expected to receive an impact from the AZR Rockwood Plant and should have a lower PM<sub>10</sub> concentration than the High School monitor, which would be impacted by emissions from the AZR Rockwood Plant during these southwesterly wind events. However, the concentrations at the High School monitor for periods with a high differential and a southwesterly wind event are substantially less than those recorded at the Clymersville monitor (as shown in Table 7), which indicates that emissions from the AZR Rockwood Plant are not the cause of the monitored PM<sub>10</sub> differential.

**Table 7 – High Monitored Differential Periods When Wind Was from a Southwesterly Direction**

High Differential Period Dates (6-day averages)	Prevailing Wind Direction During this Period	High School Monitor Concentration (µg/m <sup>3</sup> )	Clymersville Road Monitor Concentration (µg/m <sup>3</sup> )
4/12/2014-4/17/2014	WSW	26	48
1/31/2015 - 2/5/2015	WSW	10	29
3/26/2016 - 3/31/2016	WSW	14	129
2/13/2017 - 2/18/2017	SW	25	63

2. When winds are out of a northeasterly direction, if the AZR Rockwood Plant PM<sub>10</sub> emissions were consequential to monitored values the High School monitor would be an upwind monitor to the AZR Rockwood Plant and should show lower concentrations than the Clymersville Road monitor, if the AZR Rockwood Plant emissions were impacting the Clymersville Road monitor. Of those periods with the highest PM<sub>10</sub> monitored concentration differential, none had winds from a northeasterly wind direction and one period (2/2/2018-2/7/2018), with winds from the North, showed a higher High School monitor concentration than the Clymersville Road monitor.
3. Six other high differential periods were identified when winds were out of the East-Northeast, South-Southeast, East and East-Southeast directions. These periods indicate concentrations of PM<sub>10</sub> during periods with prevailing wind directions that would not be expected to see impacts from emissions from the AZR Rockwood Plant, based on the position of the High School monitor and the Clymersville Road monitor with respect to the AZR Rockwood Plant. For all six periods, the Clymersville Road monitor recorded higher PM<sub>10</sub> concentrations than the High School monitor.

**Table 8 - Other High Monitored Differential Periods**

High Differential Period Dates (6-day averages)	Prevailing Wind Direction During this Period Wind Direction	High School Monitor Concentration ( $\mu\text{g}/\text{m}^3$ )	Clymersville Road Monitor Concentration ( $\mu\text{g}/\text{m}^3$ )
4/17/2013 - 4/22/2013	SSE	23	47
6/4/2013 - 6/9/2013	ESE	1	19
3/1/2014 - 3/6/2014	E	10	27
8/4/2014 - 8/9/2014	ENE	1	18
5/1/2015 - 5/6/2015	ENE	12	38
10/22/2016 - 10/27/2016	ESE	21	46

Per this differential analysis, the AZR Rockwood Plant emissions are not the cause and do not contribute to the highest differences between PM<sub>10</sub> monitored concentrations between the High School monitor and the Clymersville Road monitor, even in those instances where meteorological conditions would predict that the monitors acted in an upwind/downwind configuration with respect to the AZR Rockwood Plant.

In conclusion, per the PM<sub>10</sub> monitoring data collected from monitors maintained near the Rockwood Plant, PM<sub>10</sub> concentrations in the vicinity of the Rockwood Plant are very low with respect to the PM<sub>10</sub> NAAQS, with differences in the monitoring data showing no correlation to possible impacts from the AZR Rockwood Plant (*i.e.*, when the nearby monitors act as upstream and downstream PM<sub>10</sub> monitors with respect to the AZR Rockwood Plant). Because the Rockwood Plant operations are similar to, and hence, representative of the Chicago Plant operations, and the PM<sub>10</sub> monitoring data collected near the Rockwood Plant can thus be considered representative of PM<sub>10</sub> impacts from similar operations conducted at the Chicago Plant, this empirical monitoring data further supports AZR's position that continuous PM<sub>10</sub> monitoring at the Chicago Plant's property boundaries is not necessary to prevent either nuisance conditions or any adverse effect to the surrounding community and its request for variance should be granted.

Respectfully submitted,



Brad Sutek  
Plant Manager

Cc: Jennifer Hesse, Chicago Department of Public Health, Attorney