

# **Attachment 3**

## **U.S. Mineral Products (Isolatek) Discussion**

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## **U.S. Mineral Products (Isolatek - Source ID: 069-00021)**

The Indiana Department of Environmental Management (IDEM) excluded U.S. Mineral Products (USM) d/b/a Isolatek International, a mineral wool manufacturer near Huntington, Indiana in Huntington County, from its January 7, 2016 list of affected sources to be characterized under the Data Requirements Rule (DRR). Per the thresholds established within the DRR, USM's most current reported sulfur dioxide (SO<sub>2</sub>) emissions were well below levels required for the rule to be applicable. However, United States Environmental Protection Agency (U.S. EPA) identified USM as an additional source to be characterized in its March 25, 2016 response to IDEM.

Indiana strongly objects to the inclusion of USM as an affected source under the DRR. The DRR defines applicable sources as stationary sources that had actual SO<sub>2</sub> emissions in 2014 of 2,000 tons or more, or have been identified by IDEM or U.S. EPA "as requiring further air quality characterization." (40 CFR § 51.1202). Indiana did not include USM on its list of sources subject to the DRR because its reported actual SO<sub>2</sub> emissions in 2014 were 164 tons, less than one tenth of the DRR threshold of 2,000 tons or more. According to U.S. EPA's calculations (based on an informal in-house 2007 stack test), USM's actual annual emissions would have been "approximately 444 tons of SO<sub>2</sub>" in 2014. U.S. EPA also determined that 2014 was an abnormally low year for production and estimated 800 tons of SO<sub>2</sub> per year during normal production years, which is still less than half the DRR emission threshold. USM has seen a downturn since 2013 in its wool production (approximately 40,000 tons/year could be considered a prior normal), with a slight bounce back to 28,000 to 30,000 tons per year production over the last few years. This is still much lower than historic production, but should be considered the current normal production at the facility based upon current economic factors with the economy.

USM has operated the same equipment at its Huntington facility since 1982. In its March 25, 2016, letter, U.S. EPA indicated an emission factor of 21.6 lb SO<sub>2</sub> per ton of melt was appropriate for the USM cupola emissions. USM has historically used an emission factor of 8 lbs/ton based upon U.S. EPA's Compilation of Air Pollutant Emission Factors, AP-42.<sup>1</sup> As a result of a Clean Air Act (CAA) §114 information request, USM submitted to U.S. EPA, a summary sheet from stack tests previously conducted which included some engineering studies from 2007 and several pages from the 2007 study report for in-house testing of particulate matter (PM), nitrogen oxides (NO<sub>x</sub>) and SO<sub>2</sub> at the facility. That study included an informational emission test for SO<sub>2</sub> for the cupola that was only performed in the downdraft ducts. The results were reported in the summary sheet and in the study report. USM does not consider 21.6 lbs/ton

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<sup>1</sup> An emission factor of 0.2 lbs/hr was used from 2000 through 2005 as a result of an error in the data used for the annual emission calculation. When the correction was made in 2005, IDEM advised USM that it was not necessary to correct the prior emission statements.

to be a valid SO<sub>2</sub> emission factor due to problems with the cupola operation at the time of the informal test. It should be noted that IDEM did not review or approve of an SO<sub>2</sub> stack test protocol in 2007 for USM and had no compliance inspector present at the informal SO<sub>2</sub> test. According to production records available for the time period on and around the stack testing days in December 2007, the following may be concluded as summarized by USM:

On Dec 17<sup>th</sup>, the first day of the testing, both cupolas were idled in the morning for a period exceeding 2 hours each due to an electrical problem with a charge hoist. In addition, #1 cupola idled for 3 hours directly preceding the hoist issue due to a spinner motor failure. Typically, following an idle period of time, the cupola operating conditions take some time (could easily be several hours) to stabilize. Thus, the testing period started with less than normal conditions.

On Dec 18<sup>th</sup>, during the period of the testing for SO<sub>2</sub> data collection, #1 cupola went through a period of increased coke consumption and reduced melt rate. Both indicators were showing a variation from standard coke consumption and melt rate in the 10% - 20% order of magnitude. USM standard coke consumption is expected to be at ~320 – 340 lbs / ton of charge and the avg. melt rate at ~4.2 tons / hr. At the time of the stack test USM recorded an avg. of 360 – 380 lbs of coke / charge and a melt rate of ~3.9 tons / hr respectively. These variations are considered significant and clearly not normal operations. Those conditions are related and indicate that the operator was attempting to overcome the slower melt rate by adding additional coke to the charge. Based upon the increased coke consumption and slower melt rate, general operating conditions at the time of testing are best described as poor. The raw material receivers from that period of time indicate a higher than normal moisture content in received coke (10%-15% vs. standard of <7%) explaining the need for additional BTUs with every charge to evaporate the excess moisture. The low moisture content of coke is a critical factor to the cupola performance. During the period of time in 2007 around when the testing was performed, the USM coke supplier was struggling to provide a product with acceptable quality. The coke quality issues were caused by operational issues at the source. USM had no viable, alternative supply options at the time.

In order to resolve the emission factor issue, in 2016, USM conducted an engineering study of the cupola emissions. This consisted of an informational emission test that included SO<sub>2</sub> measured in the baghouse. That test indicated an SO<sub>2</sub> emission factor range of 9.22 to 9.36 lbs/ton. The results of the 2016 test confirm that the emission factor from AP-42 is appropriate to use for the USM mineral wool cupola operation. Additionally, the 164 tons of SO<sub>2</sub> reported as actual emissions for USM should be considered valid for DRR purposes. This is significantly lower than what U.S. EPA is attempting to rely upon in its analysis.

U.S. EPA identified the 2,000 ton threshold as an important indicator of the need for prioritized air quality characterization under the DRR. U.S. EPA set the threshold at a level “that prioritizes the resources that will be devoted to characterizing air quality near SO<sub>2</sub> sources nationally.” (80

FR 51061). That threshold is already on “the lower end of the range of thresholds” of sources that have the potential to contribute to violations of the National Ambient Air Quality Standard (NAAQS) (80 FR 51061). Furthermore, that threshold “strikes a reasonable balance between the need to characterize air quality near sources that have a higher likelihood of contributing to a NAAQS violation and the analytical burden on air agencies.” (80 FR 51061). U.S. EPA did not characterize the 2,000 ton threshold as an arbitrary number, but rather as an indicator of sources warranting prioritization of state and federal resources.

Because USM’s actual SO<sub>2</sub> emissions and total potential-to-emit SO<sub>2</sub> emissions remain well below the 2,000 ton applicability threshold, it is unreasonable to place it among the sources that should be prioritized to determine if it contributes to violations of the NAAQS. Including sources with actual SO<sub>2</sub> emissions of less than one-tenth the 2,000 ton threshold represents a misapplication of the intent of the DRR to prioritize sources and resources. Indiana believes that this reinterpretation of the DRR inappropriately broadens the scope and purpose of this phase of the DRR. There are numerous sources across the United States that fall into a similar category as USM. In Indiana alone, there are thirty five (35) sources with reported actual emissions between that of USM and the 2,000 ton threshold. Among these is a manufacturer of mineral wool, with very similar operational characteristics, with reported actual emissions greater than that of USM, and sources located in densely populated areas with as much as ten times the reported emissions of USM, which happens to be located in a sparsely populated rural area. Based on familiarity with how the dispersion model handles certain operations, it is safe to assume that some of these sources would clearly pose a greater threat to the NAAQS and human health than USM. Therefore, U.S. EPA’s identification of USM is clearly arbitrary and capricious.

Due to the time constraints that U.S. EPA has placed on states to implement the DRR, broadening the applicability of the DRR’s phased approach thwarts the rule’s intent to prioritize state and federal resources. IDEM does not question whether the DRR provides states or U.S. EPA the authority to identify sources with actual emissions below the 2,000 ton threshold as requiring further air quality characterization. However, if this is done, it should be done consistently and not arbitrarily. U.S. EPA did not use a systematic approach to identify sources below 2,000 tons that have the greatest probability to pose a risk to exceeding the NAAQS and threaten human health. Therefore, IDEM disagrees that USM should be arbitrarily subjected to further characterization under the DRR.

# Table 1: U.S. Mineral Products (Isolatek) 2016 Stack Test Data

**Table 1. Measured & Calculated Data-Melters' Process Line EU#1 & EU#2 CE#1  
Baghouse**

Summary of Stack Gas Parameters and Test Results					
50668.0003					
Isolatek					
Baghouse					
Page 1 of 2					
	RUN NUMBER	1-O2	2-O2	O2	
	RUN DATE	4/26/2016	4/26/2016	Average	
	RUN START	11:30	12:50		
	RUN STOP	12:18	13:48		
MEASURED DATA					
P <sub>static</sub>	Stack Static Pressure, Inches H <sub>2</sub> O	0.00	0.00	0.00	
y	Meter Box Correction Factor	0.976	0.976	0.976	
P <sub>bar</sub>	Barometric Pressure, Inches Hg	29.95	29.95	29.95	
V <sub>m</sub>	Sample Volume, ft <sup>3</sup>	48.165	49.453	48.809	
Dp <sup>1/2</sup>	Average Square Root Dp, (In. H <sub>2</sub> O) <sup>1/2</sup>	1.0948	1.1172	1.106	
DH	Avg Meter Orifice Pressure, In. H <sub>2</sub> O	3.271	3.402	3.336	
T <sub>m</sub>	Average Meter Temperature, °F	86.3	86.5	86.4	
T <sub>s</sub>	Average Stack Temperature, °F	230.3	231.3	230.8	
V <sub>c</sub>	Condensate Collected, ml	16.0	13.0	14.50	
CO <sub>2</sub>	Carbon Dioxide content, % by volume	0.0	0.0	0.00	
O <sub>2</sub>	Oxygen content, % by volume	20.8	20.8	20.8	
N <sub>2</sub>	Nitrogen content, % by volume	79.2	79.2	79.2	
C <sub>o</sub>	Pitot Tube Coefficient	0.84	0.84	0.84	
	Circular Stack? 1=Y, 0=N:	1	1		
A <sub>s</sub>	Diameter or Dimensions, Inches:	37.00	37.00	37.00	
Q	Sample Run Duration, minutes	48	48	48	
D <sub>n</sub>	Nozzle Diameter, Inches	0.238	0.238	0.238	
CALCULATED DATA					
A <sub>n</sub>	Nozzle Area, ft <sup>2</sup>	0.000309	0.000309	0.000309	
V <sub>m(Std)</sub>	Standard Meter Volume, ft <sup>3</sup>	45.82	47.05	46.44	
V <sub>m(Std)</sub>	Standard Meter Volume, m <sup>3</sup>	1.298	1.332	1.315	
Q <sub>m</sub>	Average Sampling Rate, dscfm	0.955	0.980	0.967	
P <sub>s</sub>	Stack Pressure, Inches Hg	29.95	29.95	29.95	
B <sub>ws</sub>	Moisture, % by volume	1.6	1.3	1.5	
B <sub>w(Std)</sub>	Moisture (at saturation), % by volume	142.1	145.0	143.6	
V <sub>w(Std)</sub>	Standard Water Vapor Volume, ft <sup>3</sup>	0.753	0.612	0.683	
1-B <sub>ws</sub>	Dry Mole Fraction	0.984	0.987	0.985	
M <sub>d</sub>	Molecular Weight (d.b.), lb/lb-mole	28.83	28.83	28.83	
M <sub>s</sub>	Molecular Weight (w.b.), lb/lb-mole	28.66	28.69	28.67	
V <sub>s</sub>	Stack Gas Velocity, ft/s	70.5	72.0	71.2	
A	Stack Area, ft <sup>2</sup>	7.5	7.5	7.5	
Q <sub>s</sub>	Stack Gas Volumetric flow, acfm	31,587	32,238	31,912	
Q <sub>s</sub>	Stack Gas Volumetric flow, dscfm	23,786	24,320	24,053	
Q <sub>s</sub>	Stack Gas Volumetric flow, dscmm	674	689	681	
I	Isokinetic Sampling Ratio, %	97.0	97.4	97.2	

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# **Attachment 4**

Alcoa Warrick Attainment Discussion

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**ALCOA Warrick Power Plant (Source ID: 173-00007) and Warrick Operations (Source ID: 173-00002)**

Aluminum Manufacturing Company of America (ALCOA) operates an aluminum manufacturing facility and power plant in Newburgh, Indiana, along the northern bank of the Ohio River in Anderson Township, Warrick County. The Indiana Department of Environmental Management (IDEM) believes Warrick Power Plant and Warrick Operations and the surrounding area should be designated attainment based on historical sulfur dioxide (SO<sub>2</sub>) ambient monitoring data showing attainment of the SO<sub>2</sub> standard.

Warrick Power and Warrick Operations were determined to be sources subject to United States Environmental Protection Agency's Data Requirements Rule (DRR) based on actual 2014 SO<sub>2</sub> emissions of 4,993 tons and 3,500 tons, respectively. However, Warrick Operations shut down its smelter operations as of March 31, 2016, and has therefore ceased to generate potline point SO<sub>2</sub> emissions, potline smelter line source SO<sub>2</sub> emissions, or SO<sub>2</sub> emissions from the anode baking ring furnace. Warrick Operations currently operates a rolling mill that uses natural gas and will generate SO<sub>2</sub> emissions of less than one ton per year.

Historical SO<sub>2</sub> data from monitors operated by ALCOA prior to the shut-down of the smelter show attainment of the 2010 primary SO<sub>2</sub> 1-hour National Ambient Air Quality Standard (NAAQS). Tables 1 and 2 provide data from SO<sub>2</sub> monitors operated by ALCOA for several years prior to the smelting operation's shutdown. The tables also show data from the SO<sub>2</sub> monitor that IDEM operates in the region near the ALCOA Warrick facility.

As shown in the tables, all 99<sup>th</sup> percentile values since 2009 are below the 1-hour standard. In addition, the most recently available design value (2008 – 2010), and all recent partial-year design values, are also below the 1-hour standard. These low monitor values occurred during the time when the operations plant and the power plant were in full operation. As such, it is reasonable to conclude that the area surrounding the ALCOA Warrick facilities is in attainment of the 1-hour SO<sub>2</sub> NAAQS. As such, Indiana is recommending Anderson Township, Warrick County, Indiana as attainment.

Table 1: Warrick County SO<sub>2</sub> Monitor Data - 99<sup>th</sup> Percentile Values  
(parts per billion) (2005 – 2016)

Site ID	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
IDEM Operated												
181630021	66	67	69	41	17	18.8	19.4	16.5	18.6	32.3	18	11 <sup>a</sup>
ALCOA Operated												
181730002	143	199	103	111	38	18	Not Operational				23	36 <sup>b</sup>
181730004	Not Operational										63	57 <sup>b</sup>
181730005	Not Operational										46	42 <sup>b</sup>
181730012	Not Operational										59	62 <sup>b</sup>

<sup>a</sup> – Data through July 31, 2016.

<sup>b</sup> – Data through June 30, 2016.

Table 2: Warrick County SO<sub>2</sub> Monitor Data – Design Values  
(parts per billion) (2007 – 2016)

Site ID	2005 - 2007	2006 - 2008	2007 - 2009	2008 - 2010	2009 - 2011	2010 - 2012	2011 - 2013	2012 - 2014	2013 – 2015	2014 – 2016
IDEM Operated										
181630021	67	59	43	26	18	18	18	22	23	21
ALCOA Operated										
181730002	148	138	84	56	Not Operational				23 <sup>a</sup>	30 <sup>b</sup>
181730004	Not Operational								63 <sup>a</sup>	60 <sup>b</sup>
181730005	Not Operational								46 <sup>a</sup>	44 <sup>b</sup>
181730012	Not Operational								59 <sup>a</sup>	61 <sup>b</sup>

<sup>a</sup> – Based on one year of data.

<sup>b</sup> – Based on two years of data.

# **Attachment 5**

ArcelorMittal – Burns Harbor SO<sub>2</sub> Air Quality Monitor  
System Documentation

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# U.S. EPA Confirmation Letter for Siting Methodologies of ArcelorMittal Burns Harbor SO<sub>2</sub> Monitor



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

AUG 5 2018

REPLY TO THE ATTENTION OF

AT-18J

Mr. Mark Derf  
Office of Air Quality  
Indiana Department of Environmental Quality  
Indiana Government Center North  
100 North Senate Avenue  
Indianapolis, Indiana 46204

Dear Mr. Derf:

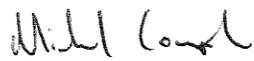
The purpose of this letter is to respond to your request for concurrence with the siting recommendation for a sulfur dioxide (SO<sub>2</sub>) air quality monitor near the ArcelorMittal-Burns Harbor facility, located in Porter County, Indiana. The monitor is being sited in response to the designation process detailed in EPA's Data Requirements Rule for SO<sub>2</sub>. This new monitor will supplement an existing monitor.

We have reviewed your June 2016 Monitoring Protocol document and, based on the air quality modeling conducted by the facility and IDEM, agree that the western boundary of the ArcelorMittal facility is the best location for a monitor. Additionally, based on information provided to Region 5 by IDEM, the availability of land on the western border that would be considered ambient air and available for lease is extremely limited. This resulted in your recommendation that the existing lead monitor site is the best available location. This site is represented by the green dot in Figure 13.3 of the IDEM protocol document. Region 5 agrees that the placement of a monitor at the location of the existing lead site is acceptable. This will augment the existing SO<sub>2</sub> monitor located on the eastern edge of the facility.

While this letter confirms our agreement that the addition of a single monitor located at the existing lead monitor site is acceptable based on air quality modeling conducted in accordance with EPA's Monitoring Technical Assistance Document and site specific accessibility information, this letter does not confirm that the proposed site will meet each of the monitor siting requirements specified in 40 CFR part 58 Appendix E. Prior to beginning installation, IDEM should evaluate and ensure this site will meet those criteria and provide Region 5 with the results of your monitor siting assessment showing that all criteria will be able to be met at this proposed location.

Thank you for the advanced coordination on this issue. If you have any questions or need additional information, please contact Randy Robinson at 312 353-6713 or Jesse McGrath at 312 886-1532.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Compber". The signature is written in a cursive, slightly stylized font.

Michael Compber  
Chief  
Air Monitoring and Analysis Section

Enclosures



# U.S. EPA's Approval of IDEM's 2017 Ambient Air Monitoring Network Plan



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

OCT 31 2016

REPLY TO THE ATTENTION OF:  
AT-18J

Mr. Keith Baugues  
Assistant Commissioner  
Office of Air Quality  
Indiana Department of Environmental Management  
100 North Senate Avenue  
Indianapolis, IN 46204-2251

Dear Mr. Baugues:

The U.S. Environmental Protection Agency has reviewed the Indiana Department of Environmental Management's 2017 Ambient Air Monitoring Network Plan and approves the plan and proposed changes to your network of air quality monitors, but for the following:

- Lead emissions from the Crane Division Naval Surface Warfare Center have increased from the time of IDEM's original waiver from 1.2 tons/year to 2.3 tons/year. In light of this increase, EPA requires that IDEM either operate a lead monitor at this facility, or request a waiver which demonstrates that lead values will not exceed 50% of the NAAQS.
- EPA has reviewed the analyses in Appendix B and does not approve exclusion of the PM<sub>2.5</sub> Federal Equivalent Method data at sites 18-141-0015 or 18-163-0021 from comparison to the NAAQS. Where IDEM determines specific daily values are erroneous and can identify the causes of the error, IDEM should invalidate the specific data, rather than exclude all data from comparison to the NAAQS.

EPA evaluated the plan, as well as information about monitoring sites submitted to the Air Quality System database, and confirmed, with the above exceptions, that IDEM's network meets the siting and operation requirements of 40 CFR Part 58.

Additionally, EPA has reviewed and approves IDEM's lead monitoring waivers in Appendix D for the ALCOA Warrick Power Plant in Warrick County, and Ardagh Glass Inc. in Randolph County, as per 40 CFR Part 58 Appendix D section 4.5(ii).

If you determine that changes to your monitoring network are needed due to unplanned circumstances or revisions to the federal ambient monitoring and quality assurance requirements, the modifications must be reviewed and approved by EPA.

If you have any questions, please contact Michael Compher, Air Monitoring and Analysis Section Chief, at (312) 886-5745.

Sincerely,



Ed Nam  
Acting Director  
Air and Radiation Division

# Clean Air Engineering Certifications for ArcelorMittal Burns Harbor's SO<sub>2</sub> Monitor



## Ambient SO<sub>2</sub> Monitoring System Factory Acceptance Test Protocol and Checklist

1

2 Clean Air Project Information

Project Number:	13075
Project Manager:	Jack Demkovich
Purchaser:	ArcelorMittal
Installation Location:	Port of Indiana, Burns Harbor

3 System Information

System Type:	SO <sub>2</sub> Ambient
System Serial Number:	N/A
System Site ID:	TBD
Date Installed:	12-7-17

4 FAT Test Information

Test Date:	12/8 - 12/13/2016
Test Site:	Final Installation Location
Test Supervisor:	Jack Demkovich
Test Engineer:	Jack Demkovich
Witness & Affiliation:	--

5 Instructions:

6 Use check boxes ☐ to acknowledge completion of each step.

7 Note status of each completed test as follows: PASS/FAIL/SEE COMMENTS.

8 A Comments page is included at the end of the document.

9 Comments are required for any test marked FAIL and for deviations from this checklist.

10 Comments must reference a form line number.

11 Test Engineer(s) and Witness(es) to sign this form upon completion.

12 **System Documentation**13 *Attach the following documents for inspection*

- 14 ☒ Major Component Serial ID list
- 15 ☒ Calibration Reference Certifications
- 16 ☒ Project Drawings
- 17 ☒ QAPP *Draft version subject to final approval by IDEM*

18 **System Documentation:**PASS ☒ FAIL ☐ SEE COMMENTS ☐19  
20 **System Physical Inspection**

- 21 ☒ Primary system components are available for inspection
- 22 ☒ Shelter dimensions match construction drawings
- 23 ☒ Shelter interior layout matches construction drawings
- 24 ☒ Shelter construction materials correspond to construction specifications
- 25 ☒ Shelter electrical service matches construction specifications
- 26 Voltage: 240 Phase: 1 Current: 100A @ 240V
- 27 ☒ Shelter HVAC matches construction specifications:
- 28 Heat BTU: \_\_\_\_\_ Cooling BTU: 2 ton SN: L163362236
- 29 ☒ Site specific labeling (if applicable) is installed & meets specification
- |  |                                |                              |                 |
|--|--------------------------------|------------------------------|-----------------|
| 30 <input checked="" type="checkbox"/> | Analyzer #1 Mfg: <u>THERMO</u> | Model: <u>43i</u>            | Gas: <u>SO2</u> |
| 31 <input type="checkbox"/>            | Analyzer #2 Mfg: <u>N/A</u>    | Model: <u>N/A</u>            | Gas: <u>N/A</u> |
| 32 <input type="checkbox"/>            | Analyzer #3 Mfg: <u>N/A</u>    | Model: <u>N/A</u>            | Gas: <u>N/A</u> |
| 33 <input checked="" type="checkbox"/> | Calibrator Mfg: <u>THERMO</u>  | Model: <u>146i</u>           |                 |
| 34 <input checked="" type="checkbox"/> | Logger Mfg: <u>AGILAIRE</u>    | Model: <u>8872</u>           |                 |
| 35 <input checked="" type="checkbox"/> | UPS Mfg: <u>APC</u>            | Model: <u>SMART UPS 1500</u> |                 |
| 36 <input type="checkbox"/>            | Other Mfg: <u>N/A</u>          | Model: <u>N/A</u>            |                 |
| 37 <input type="checkbox"/>            | Other Mfg: <u>N/A</u>          | Model: <u>N/A</u>            |                 |
| 38 <input type="checkbox"/>            | Other Mfg: <u>N/A</u>          | Model: <u>N/A</u>            |                 |
- 39 ☒ Number of PCs supplied = Server PC (Pittsburgh), Logger PC & Monitor
- 40 ☒ I/O components include:
- 41 ☒ Ethernet switch
- 42 ☒ Cellular Modem, Carrier: ATT Number: 2245323513
- 43 ☒ Cloud Backup, Provider: Wellkeeper Number: 5056972685

44  
45  
46 **Physical Inspection:**PASS ☒ FAIL ☐ SEE COMMENTS ☐Initials: JD / AKADate: 12/10/16

47 **Component IP Address List**

48	IP Verified	Component	IP Address
49	<input checked="" type="checkbox"/>	MODEM	192.168.13.31:9191
50	<input checked="" type="checkbox"/>	AGILAIRE LOGGER	192.168.13.101
51	<input checked="" type="checkbox"/>	43i	192.168.13.102
52	<input checked="" type="checkbox"/>	146i	192.168.13.103
53	<input type="checkbox"/>		
54	<input type="checkbox"/>		
55	<input type="checkbox"/>		
56	<input type="checkbox"/>		
57	<input type="checkbox"/>		
58	<input type="checkbox"/>		
59	<b>IP Verification:</b>		PASS <input checked="" type="checkbox"/> FAIL <input type="checkbox"/> SEE COMMENTS <input type="checkbox"/>

60  
61 **HVAC Operation Verification**

62	<input checked="" type="checkbox"/>	Set HVAC temperature to 25°C (78°F)
63	<input checked="" type="checkbox"/>	Energize sampling system
64	<input checked="" type="checkbox"/>	Initiate sampling (all shelter-housed components must be operational)
65	<input checked="" type="checkbox"/>	Allow system to operate for at least 3 days
66	<input checked="" type="checkbox"/>	Retrieve hourly data logs at completion of the test period
67	<input checked="" type="checkbox"/>	Verify HVAC operation:
68		<div>• Start Date &amp; Time: 12-10-16, 09:00</div>
69		<div>• End Date &amp; Time: 12-13-16, 08:00</div>
70		<div>• Min cabinet temperature: 24.7</div>
71		<div>• Max cabinet temperature: 25.1</div>
72	<input checked="" type="checkbox"/>	All data within ±2°C (3.6°F):
73	<input checked="" type="checkbox"/>	All data within 20° to 30°C, (68° to 86°F):
74	<div><div>HVAC Operation Verified:</div><div>PASS<input checked="" type="checkbox"/> FAIL<input type="checkbox"/> SEE COMMENTS<input type="checkbox"/></div></div>	

Initials: JD / AKADate: 12/10/16

75 **Sampling System Inspection**

- 76 ☒ Sampling system is complete with:
- 77 ☒ Inverted Funnel Inlet
- 78 ☒ Support System
- 79 ☒ Calibration Tee at Funnel
- 80 ☒ Filter
- 81 ☒ Moisture Trap
- 82 ☒ All components Teflon or glass
- 83 ☒ All components are new and clean
- 84 ☒ Exhaust tubing installed
- 85 ☒ All system interconnecting tubing is installed
- 86 ☒ Funnel inlet is 3 to 6 m (10-20 ft) above ground: 3.84
- 87 ☒ Inlet distance to nearest obstruction: m: 1.1 DISTANCE TO ROOF TOP
- 88 ☒ Sample Flow Rate L/min: 0.495
- 89 ☒ Sample Line Vacuum inHg: 0.16
- 90 ☒ Tubing ID (1/8 inch): cm: 0.318
- 91 ☒ Estimated Length (25 ft): cm: 520
- 92 ☒ Volume of tubing: cm<sup>3</sup>: 41.3
- 93 ☒ Volume of Trap/Filter: cm<sup>3</sup>: 50.0 total vol= 91.3
- 94 ☒ Calculate residence time: sec: 11.06
- 95 ☒ Residence time < 20 seconds? ☒ YES

**Sampling System Inspection:**PASS ☒ FAIL ☐ SEE COMMENTS ☐98 **System Startup and Communication Verification**

- 99 ☒ Energize all system components and allow system to fully start up
- 100 ☒ Open calibration gas regulator
- 101 ☒ Enter Agilent logger software
- 102 ☒ Use a remote PC with Team Viewer to verify connectivity
- 103 ☒ Verify logger time and date, reset if necessary
- 104 ☒ Verify EnviroNics 7000 operating temperature is 300°C
- 105 ☒ Verify EnviroNics 7000 output pressure is set to 25psi
- 106 ☒ Verify EnviroNics 7000 dewpoint indicator is BLUE
- 107 ☒ Verify no alarms are present on the Thermo 146i
- 108 ☒ Verify no alarms are present on the Thermo 43i

Initials: JD / AKADate: 12/10/16

109	<input checked="" type="checkbox"/>	Verify the following parameters are updating and logger and instrument displays agree:				
110			Logger	Instrument	Units	%Diff PASS (<1%)
111	<input checked="" type="checkbox"/>	SO <sub>2</sub> - Thermo 43i - Logger display	2.09	2.08	ppb	0.5% <input checked="" type="checkbox"/>
112	<input checked="" type="checkbox"/>	SO <sub>2</sub> Internal Temp (SO <sub>2</sub> INTTP)	35	35	°C	0.0% <input checked="" type="checkbox"/>
113	<input checked="" type="checkbox"/>	SO <sub>2</sub> Chamber Temp (SO <sub>2</sub> CHMTP)	45.3	45.3	°C	0.0% <input checked="" type="checkbox"/>
114	<input checked="" type="checkbox"/>	SO <sub>2</sub> Chamber Press (SO <sub>2</sub> CHMPR)	730.6	730.6	mmHg	0.0% <input checked="" type="checkbox"/>
115	<input checked="" type="checkbox"/>	SO <sub>2</sub> Sample Flow (SO <sub>2</sub> FLOW)	0.494	0.494	l/min	0.0% <input checked="" type="checkbox"/>
116	<input checked="" type="checkbox"/>	SO <sub>2</sub> PMT Volts (SO <sub>2</sub> PMTVT)	-721.5	-721.5	V	0.0% <input checked="" type="checkbox"/>
117	<input checked="" type="checkbox"/>	SO <sub>2</sub> Flash Volts (SO <sub>2</sub> FLSVT)	1006.2	1006	V	0.0% <input checked="" type="checkbox"/>
118	<input checked="" type="checkbox"/>	SO <sub>2</sub> Lamp Intensity (SO <sub>2</sub> LINT)	92.0	92.0	%	0.0% <input checked="" type="checkbox"/>
119	<input checked="" type="checkbox"/>	SO <sub>2</sub> Background (SO <sub>2</sub> BCKGR)	2.11	2.11	ppb	0.0% <input checked="" type="checkbox"/>
120	<input checked="" type="checkbox"/>	SO <sub>2</sub> Cal Coefficient (SO <sub>2</sub> COEFF)	1.012	1.012	N/A	0.0% <input checked="" type="checkbox"/>
121	<input checked="" type="checkbox"/>	Cal Gas Concentration (CALGAS)	400.0	400	ppb	0.0% <input checked="" type="checkbox"/>
122	<input checked="" type="checkbox"/>	Cal Gas Target Flow (CALTARG)	37.7	37.70	scc/min	0.0% <input checked="" type="checkbox"/>
123	<input checked="" type="checkbox"/>	Cal Gas Actual Flow (CALACTL)	37.7	37.66	scc/min	0.1% <input checked="" type="checkbox"/>
124	<input checked="" type="checkbox"/>	Cal Gas Zero Gas Target Flow (CALZTRG)	2000	2000	scc/min	0.0% <input checked="" type="checkbox"/>
125	<input checked="" type="checkbox"/>	Cal Gas Zero Gas Actual Flow (CALZACT)	1996	1996	scc/min	0.0% <input checked="" type="checkbox"/>
126	<input checked="" type="checkbox"/>	Cal Gas Total Target Flow (CALTOTTG)	2000	2000	scc/min	0.0% <input checked="" type="checkbox"/>
127	<input checked="" type="checkbox"/>	Cal Gas Total Actual Flow (CALTOTAC)	1996	1996	scc/min	0.0% <input checked="" type="checkbox"/>
128	<input checked="" type="checkbox"/>	Cal Gas Pressure (CALGSPRS)	1873.9	1862	scc/min	0.6% <input checked="" type="checkbox"/>
129	<input checked="" type="checkbox"/>	Sample Line Vacuum (SMPLNVAC)	0.16	N/A	inHg	N/A <input checked="" type="checkbox"/>
130	<input checked="" type="checkbox"/>	AC Power Loss (ACPWRLOSS)	0.7	N/A	V	N/A <input checked="" type="checkbox"/>
131	<input checked="" type="checkbox"/>	Low UPS Battery (LOWBATT)	1	N/A	V	N/A <input checked="" type="checkbox"/>
132	<input checked="" type="checkbox"/>	Cal Zero Gas Pressure (ZAGPRESS)	26.5	26.5	psi	0.0% <input checked="" type="checkbox"/>
133	<input checked="" type="checkbox"/>	Shelter Temperature (SHLTTEMP)	25.9	N/A	°C	N/A <input checked="" type="checkbox"/>
134		System Startup Successful: PASS <input checked="" type="checkbox"/> FAIL <input type="checkbox"/> SEE COMMENTS <input type="checkbox"/>				

Initials: JD / AKA

Date: 12/10/16



135 *System should be running for at least 24 hours and be calibrated before calibration verification*

136 **Multipoint Calibration Verification**

- 137 ☒ Trigger the Multipoint Calibration cycle through the logger
- 138 ☒ Allow the calibration cycles to complete
- 139 ☒ Complete a Multipoint Calibration form using logger data
- 140 ☒ Attach completed form to this document

141 **Multipoint Calibration Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

143 **One-Point Quality Control (Precision) Check Verification**

- 144 ☒ Trigger the One-Point Quality Control Check through the logger
- 145 ☒ Allow the cycle to complete
- 146 ☒ Complete a One-Point QC Check form using logger data
- 147 ☒ Attach completed form to this document

148 **One-Point QC Check Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

150 **Data Validation (DV) Check Verification**

- 151 ☒ Trigger the Data Validation Check through the logger
- 152 ☒ Allow the cycle to complete
- 153 ☒ Complete a Data Validation check form using logger data
- 154 ☒ Attach completed form to this document

155 **DV Check Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

157 **Automated Span Drift Verification**

- 158 ☒ Allow the system to operate for at least 24 hours
- 159 ☒ Allow at least one automated cycle to complete
- 160 ☒ Manually poll Calibration Results from logger into AirVision
- 161 ☒ Attach Calibration Report generated through AirVision to this document

162 **Automated Span Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

164 **Automated Zero Drift Verification**

- 165 ☒ Allow the system to operate for at least 24 hours
- 166 ☒ Allow at least one automated cycle to complete
- 167 ☒ Manually poll Calibration Results from logger into AirVision
- 167 ☒ Attach Calibration Report generated through AirVision to this document

168 **Automated Zero Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

170 **Shelter Ambient Temperature Sensor Calibration Verification**

- 171 ☒ Perform a shelter temp sensor calibration per the SOP
- 172 ☒ Complete the Shelter TC Calibration form
- 173 ☒ Attach completed form to this document

174 **Shelter Temp Sensor Cal Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐



175 **Data Backup Verification**176 *Allow system to run under normal operation conditions for 3 days*177 **Agilaire 8872 Logger Backup**

- 178 ☒ Open folder "C:\SQL\_Database\_Backups\_for\_AVTrend" on the Agilaire 8872 Logger
  - 179 ☒ AVData.bak file is present in folder
  - 180 ☒ Date modified of AVData.bak is the current date, time modified is 04:30
- 181 ☒ Open folder "Weekly\_Backups"
  - 182 ☒ All files are named "8872\_AVBackup\_MMDDYY\_hhmmss"
  - 183 ☒ Date modified of newest file is the most recent Sunday
  - 184 ☒ No files older than 14 days old
  - 185 ☒ No more than two files in folder
- 186 ☒ Open Z: drive
  - 187 ☒ AVData.bak file is only file present in Z:
  - 188 ☒ Date modified of AVData.bak is the current date, time modified is 04:30

189 **Agilaire 8872 Logger Backup:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

191 **AirVision Server Backup**

- 192 ☒ Open the folder "C:\SQL\_Database\_Backups\_For\_AirVision" on the AirVision Server
  - 193 ☒ AVData.bak file is present in folder
  - 194 ☒ Date modified of AVData.bak is the current date, time modified is 04:30
- 195 ☒ Open folder "Weekly\_Backups"
  - 196 ☒ All files are named "Server\_AVBackup\_MMDDYY\_hhmmss"
  - 197 ☒ Date modified of newest file is the most recent Sunday
  - 198 ☒ No files older than 14 days old
  - 199 ☒ No more than two files in folder

200 **AirVision Server Backup:** PASS ☒ FAIL ☐ SEE COMMENTS ☐

202 **Dropbox Backup**

- 203 ☒ Open the folder "C:\Users\mrclean\Dropbox (CleanAir)\13075\_ArcelorMittal\_SO2\_Backup\_Data\_SERVER" on the AirVision Server
  - 204 ☒ AVData.bak file is present in folder
  - 205 ☒ Date modified of AVData.bak is the current date, time modified is 04:30
- 207 ☒ In the Dropbox folder, open "13075\_ArcelorMittal\_SO2\_Backup\_Data\_TEXT"
  - 208 ☒ 1-Minute\_Data folder is present
  - 209 ☒ 5-Minute\_Data folder is present
  - 210 ☒ Hourly\_Data folder is present
- 211 ☒ Open "1-Minute\_Data" folder
  - 212 ☒ Several .CSV files are present, all with format "RAW\_1MIN\_Data\_Mmddyyyy.csv"
  - 213 ☒ Date modified of most recent file is the current date, time modified is XX:XX
  - 214 ☒ When file is opened, opens Excel, is populated, and is easily readable
- 215 ☒ Open "5-Minute\_Data" folder
  - 216 ☒ Several .CSV files are present, all with format "RAW\_5MIN\_Data\_Mmddyyyy.csv"
  - 217 ☒ Date modified of most recent file is the current date, time modified is XX:XX
  - 218 ☒ When file is opened, opens Excel, is populated, and is easily readable
- 219 ☒ Open "Hourly\_Data" folder
  - 220 ☒ Several .CSV files are present, all with format "RAW\_HOUR\_Data\_Mmddyyyy.csv"
  - 221 ☒ Date modified of most recent file is the current date, time modified is XX:XX
  - 222 ☒ When file is opened, opens Excel, is populated, and is easily readable

223 **Dropbox Backup Verified:** PASS ☒ FAIL ☐ SEE COMMENTS ☐



## System Equipment List

PROJECT: ArcelorMittal USA / Job No: 13073  
 INSTALLATION LOCATION: Burns Harbor, IN  
 STATION ID: \_\_\_\_\_

ITEM	EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	OPERATIONAL DATE
1	SO2 Analyzer	Thermo Scientific	43iTLE	1162320006	12/10/2016
2	Gas Dilution Calibrator	Thermo Scientific	146i	1162320005	12/10/2016
3	Data Control System	Agilair	8872	0609	12/10/2016
4	Zero Air Generator (ZAG)	EnviroNics	7000	7223	12/10/2016
5	Temperature Probe	Agilair	RS-232 Air Temp Sensor	RTD-01	12/10/2016
6	Cylinder Gas Pressure Transmitter	Ashcroft	GC35	6600057 R	12/10/2016
7	Cylinder Gas Regulator	Scott Specialty Gases	51215A660	817334	12/10/2016
8	ZAG Output Pressure Transmitter	Dwyer	628-09-GH-P1-E1-S1	13075PT1	12/10/2016
9	Sample Vacuum Pressure Transmitter	ControllerSensors	860-0.00/30.00-I-12-I-P	8100040	12/10/2016
10	Uninterruptible Power Supply	APC	SUA1500RM2U	A50733130756	12/10/2016
11					
12					
13					
14					
15					

## Transfer Standard Certification Schedule

PROJECT: ArcelorMittal USA / Job No: 13075

INSTALLATION LOCATION: Burns Harbor, IN

STATION ID: \_\_\_\_\_

ITEM	EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CYLINDER NUMBER	CERTIFICATION DATE	RECERTIFICATION DATE
1	Gas Dilution Calibrator	Thermo Scientific	146i	1162320005	--	11/29/2016	5/29/2017
2	Station SO2 Gas Standard	Airgas	N/A	--	CC7590	11/29/2016	5/29/2017
3	Digital Thermometer	Omega	HH370	160407973	--	12/5/2016	12/5/2017
4	Temperature Probe	Omega	RS-232	RTD-01	--	12/8/2016	6/8/2017
5	Audit Gas Standard	Airgas	N/A	--	--	--	--
6	Audit UHP Zero Air	Airgas	N/A	--	--	--	--
7	Audit Dilution Calibrator	EnviroNics	6100	--	--	--	--
8							
9							
10							
11							
12							
13							
14							
15							

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR QUALITY**

**CERTIFICATION - AIR MASS FLOW METER**

Cert Type Agency Cert Date Recert Date Performed By  
 90 CLEAN AIR ENGINEERING 28-NOV-2016 28-MAY-2017 ALDAVIDS

Transfer Standard					
Flow Meter SN	Brand	Model	Calibrator SN	Brand	Model
1162320005-A	THERMO	146I	1162320005	THERMO	146I

Previous Flow Meter Certification			Primary Flow Standard			
Slope	Intercept	Cert Date	Standard SN	Brand	Model	Type
1.00000	0.00000		378+ / 790+	FLUKE / AIR MOLBLOC		MASS FLOW

Air/Dil Meter Setting	Std Flow (L/min)	Curve Flow (L/min)	Pct Diff (%)	Pass/Fail	Current Curve Flow (L/min)	Prev Curve Flow (L/min)	Pct Diff (%)
0.538	0.5380	0.5380	0.0	PASS	0.5380	0.5380	0.0
2.009	2.0090	2.0090	0.0	PASS	2.0090	2.0090	0.0
3.427	3.4270	3.4270	0.0	PASS	3.4270	3.4270	0.0
4.838	4.8380	4.8380	0.0	PASS	4.8380	4.8380	0.0
6.245	6.2450	6.2450	0.0	PASS	6.2450	6.2450	0.0
7.685	7.6850	7.6850	0.0	PASS	7.6850	7.6850	0.0
9.199	9.1990	9.1990	0.0	PASS	9.1990	9.1990	0.0

**Comments**

FLOWES ENTERED INTO MFC TABLE FOR SLOPE INTERCEPT OF 1/0. 4 FLOWES CHECKED AFTERWARDS AND FOUND TO ALL BE WITHIN 1% OF ACTUAL FLOW. CERTIFICATION GOOD TILL 11/28/17 DUE TO THIS BEING A BENCH CALIBRATOR.

Slope	Intercept	Corr Coef
1.00000	0.00000	1.00000

**RECERTIFICATION IS DUE: 28-MAY-2017**

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR QUALITY**

**CERTIFICATION - GAS MASS FLOW METER**

Cert Type	Agency	Cert Date	Recert Date	Performed By
90	CLEAN AIR ENGINEERING	28-NOV-2016	28-MAY-2017	ALDAVIDS

**Transfer Standard**

Flow Meter SN	Brand	Model	Calibrator SN	Brand	Model
1162320005-G	THERMO	146I	1162320005	THERMO	146I

**Previous Flow Meter Certification**

Slope	Intercept	Cert Date
1.00000	0.00000	

**Primary Flow Standard**

Standard SN	Brand	Model	Type
378+ / 788+	FLUKE / GAS MOLBLOC		MASS FLOW

Gas Meter Setting	Std Flow (cc/min)	Curve Flow (cc/min)	Pct Diff (%)	Pass/Fail	Current Curve Flow (cc/min)	Prev Curve Flow (cc/min)	Pct Diff (%)
2.608	2.6080	2.6080	0.0	PASS	2.6080	2.6080	0.0
10.069	10.0690	10.0690	0.0	PASS	10.0690	10.0690	0.0
17.471	17.4710	17.4710	0.0	PASS	17.4710	17.4710	0.0
24.819	24.8190	24.8190	0.0	PASS	24.8190	24.8190	0.0
32.142	32.1420	32.1420	0.0	PASS	32.1420	32.1420	0.0
39.532	39.5320	39.5320	0.0	PASS	39.5320	39.5320	0.0
48.100	48.1000	48.1000	0.0	PASS	48.1000	48.1000	0.0

**Comments**

FLOWES ENTERED INTO MFC TABLE FOR SLOPE/INTERCEPT OF 1/0. 4 FLOWES CHECKED AFTERWARDS AND FOUND TO BE LESS THAN 0.1% DIFFERENT FROM TRUE FLOW. CERT GOOD UNTIL 11/28/17 DUE TO THIS BEING A BENCH CALIBRATOR THAT WILL BE AT ONE STATION.

Slope	Intercept	Corr Coef
1.00000	0.00000	1.00000

**RECERTIFICATION IS DUE: 28-MAY-2017**

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR QUALITY**

**CERTIFICATION - SO<sub>2</sub>, DILUTION WITH MASS FLOW**

Cert Type	Agency	Cert Date	Recert Date	Performed By
10	CLEAN AIR ENGINEERING	29-NOV-2016	29-MAY-2017	ALDAVIDS

**Transfer Standard**

Calibrator SN	Brand	Model	Cylinder SN	Brand	Prev Conc	Prev Cert Date
1162320005	THERMO	1461	CLEAN CC7590	AIRGAS		

**Transfer Analyzer**

SN	Brand	Model	Slope	Intercept	Calibration Date	Verification Date
0524312232	THERMO E.C.	431	1.00138	-0.00050	29-NOV-2016	13-DEC-2006

**Primary Standard**

Calibrator SN	Brand	Model	Standard SN	Type	Brand	Concentration
462-S	API	700E	ND47923		AIR LIQUIDE	49.0800

**Mass Flow Meter Last Certification**

Gas Slope	1.00000	Gas Intercept	0.00000
Air Slope	1.00000	Air Intercept	0.00000

Analyzer Zero Resp (volts)	Avg Calc Conc	Pct Diff Avg vs Prev	**Pass/Fail
-0.0003	10.6100		FAIL

Gas	Air/Dilution	Gas (cc/min)	Total (cc/min)	Analyzer Resp (volts)	Meas Conc (ppm)	Calc Conc (ppm)	Pct Diff for Avg Conc	*Pass/ Fail
45.00	2.00	45.00	2,045.0	0.234	0.234	10.62	0.1	PASS
40.00	3.00	40.00	3,040.0	0.141	0.140	10.66	0.4	PASS
32.00	3.00	32.00	3,032.0	0.112	0.112	10.58	-0.2	PASS
25.00	3.00	25.00	3,025.0	0.088	0.088	10.60	-0.1	PASS
25.00	4.00	25.00	4,025.0	0.066	0.066	10.58	-0.3	PASS

Comments **Certified Cylinder Concentration (ppm):** 10.6100 **Recertification is Due:** 29-MAY-2017

\* PASS if Pct Diff of Avg vs Calc is less than + - 4.0%. All data points must PASS for a valid certification.

\*\* PASS if Pct Diff of Current vs Previous is less than + - 5.0%. If Fail, see Comment.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR QUALITY**

**CERTIFICATION - TEMPERATURE PROBE**

Cert Type	Agency	Cert Date	Recert Date	Performed By
98	CLEAN AIR ENGINEERING	05-DEC-2016	05-DEC-2017	ALDAVIDS

**Transfer Standard**

SN	Brand	Model	Prev Cert Date
160407973	OMEGA	HH370	

Primary Std SN	Brand	Type
35060-1	ISOTECH	THERMOMETER

Test Ranges	Transfer Std (C)	Primary Std (C)	Difference (C)	Pass/Fail	Met Use Pass/Fail
LOW (-5.0 to +5.0) C	0.0	0.0	0.0	PASS	PASS
AMBIENT	26.3	26.4	-0.1	PASS	PASS
HIGH (35 to 45) C	46.2	46.4	-0.2	PASS	PASS

Note: All differences must be within +/- 1.0 C or a correction factor is required. For meteorological audits all differences must be +/- 0.2 C or a correction factor is required.

Comments





## Certificate of Calibration

Customer: CLEAN AIR ENGINEERING  
Customer P.O.: 01356-44-13075  
Instrument: Omega HH370  
Order Number: WC00274278  
Description: Digital Thermometer  
Serial Number: 160407973  
Equipment I.D.#: WC274278  
Incident Number: new

### Cal-3

Omega Engineering, Inc. hereby certifies that the above instrumentation has been calibrated and tested to meet or exceed the published specifications. This calibration and testing was performed using instrumentation and standards that are traceable to the National Institute of Standards and Technology. Omega Engineering, Inc. is in compliance with ISO 10012-1, ISO 9001 and ANSI/NCSL Z540-1-1994. This certificate shall not be reproduced, except in full, without the written consent of Omega Engineering, Inc.

#### CALIBRATION INFORMATION

Cal Date: 04-Oct-16  
Cal Due Date: 04-Oct-17

Temperature: 22°C ± 5°C  
Humidity: Below 80%

Absolute Uncertainty: ± 0.19 F  
Comments:

Pass: Y Technician: DL  
Procedure: QAP-2100

Seals OK: N/A  
Certificate #: WC274278

#### STANDARDS USED FOR CALIBRATION

Asset Number	Description	NIST Traceable Number	Cal Date	Due Date
RE-098-14	IET HARS-X-6-0-01 Resistance Simulator	10NNRE09814	8-Apr-16	8-Apr-17

  
Metrology Technician:

  
Quality Assurance Inspector:

OMEGA Engineering, Inc., One Omega Circle, P.O. Box 336, Bridgeport, NJ 08014-0336 Telephone: (856) 467-4200 Fax: (856) 467-1212  
[www.omega.com](http://www.omega.com) e-mail: [info@omega.com](mailto:info@omega.com)

WC3 - 06/25A

## Calibration Results

Customer:	CLEAN AIR ENGINEERING	Result:	PASS
P.O. Number:	01356-44-13075	Cal Date:	04-Oct-16
Order Number:	WC00274278	Cal Due Date:	04-Oct-17
Instrument:	Omega HH370	Technician:	DL
Description:	Digital Thermometer	Temperature:	22 °C ± 5 °C
Serial Number:	160407973	Humidity:	Below 80%
Equipment I.D.#:	WC274278	Condition F/L:	AS-LEFT
Incident Number:	new	Procedure:	QAP-2100
		Certificate #:	WC274278

### Standards Used

Asset #	Description	NIST Traceable Number	Cal Date	Due Date
RE-098-14	IET HARS-X-6-0.01 Resistance Simulator	10NNRE09814	8-Apr-16	8-Apr-17

### Test Data

Test Description	True Value	Test Result	Lower limit	Upper limit	
Pt100 RTD Temperature Test					
-130.0 DegreeF		-130.0	-130.9	-129.1	Pass
32.0 DegreeF		31.8	31.2	32.8	Pass
212.0 DegreeF		211.8	211.0	213.0	Pass
392.0 DegreeF		391.7	390.8	393.2	Pass
552.0 DegreeF		553.5	552.6	555.4	Pass

End of Test Data



Airgas USA, LLC

2009 BELLAIRE AVE  
ROYAL OAK, MI 48067  
248-399-8020  
Airgas.com

## CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer: CLEAN AIR ENGINEERING  
Part Number: E02NI99E15A0576  
Cylinder Number: CC7590  
Laboratory: 112 - Royal Oak-32 (SAP) - MI  
PGVP Number: B62016  
Gas Code: SO2,BALN

Reference Number: 32-400770445-1  
Cylinder Volume: 144.3 CF  
Cylinder Pressure: 2015 PSIG  
Valve Outlet: 660  
Certification Date: Oct 03, 2016

Expiration Date: Oct 03, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	10.00 PPM	10.02 PPM	G1	+/- 1% NIST Traceable	09/15/2016, 10/03/2016
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	130603-28	CC403829	16.82 PPM SULFUR DIOXIDE/NITROGEN	+/-0.9%	May 31, 2019

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 SO2	FTIR	Sep 23, 2016

Triad Data Available Upon Request



  
Approved for Release

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