

VOC REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT) STUDY



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1. BACKGROUND

1.1 Reasonably Available Control Technology (RACT) Study

Ohio EPA promulgated the VOC RACT regulations (Ohio Administrative Code (OAC) 3745-21-11 effective March 27, 2022, due to the change to marginal nonattainment status for the Cincinnati area with respect to the 2015 8-hr Ozone National Ambient Air Quality Standard (NAAQS), as well as the downgrade from marginal to moderate nonattainment status for the Cleveland area, based on 2018-2020 ozone data.

Changes included in the revised standards include but are not limited to the following:

- ▶ Extension of existing VOC RACT rules in OAC 3745-21 to the Cincinnati area and
- ▶ Requirement for major VOC emitters (from non-Control Technique Guidelines sources) in the Cincinnati and Cleveland areas to conduct a detailed engineering study pursuant to draft OAC 3745-21-11.

The promulgated regulations under OAC 3745-21-11(B) require facilities located in Butler, Clermont, Cuyahoga, Geauga, Hamilton, Lake, Lorain, Medina, Portage, Summit, or Warren County and have potential VOC emissions more than 100 tons per year from non- Control Technique Guidelines (CTG) sources to conduct a detailed engineering study to determine the technical and economic feasibility of reducing VOC emissions and define RACT for affected sources.

1.2 Facility Introduction

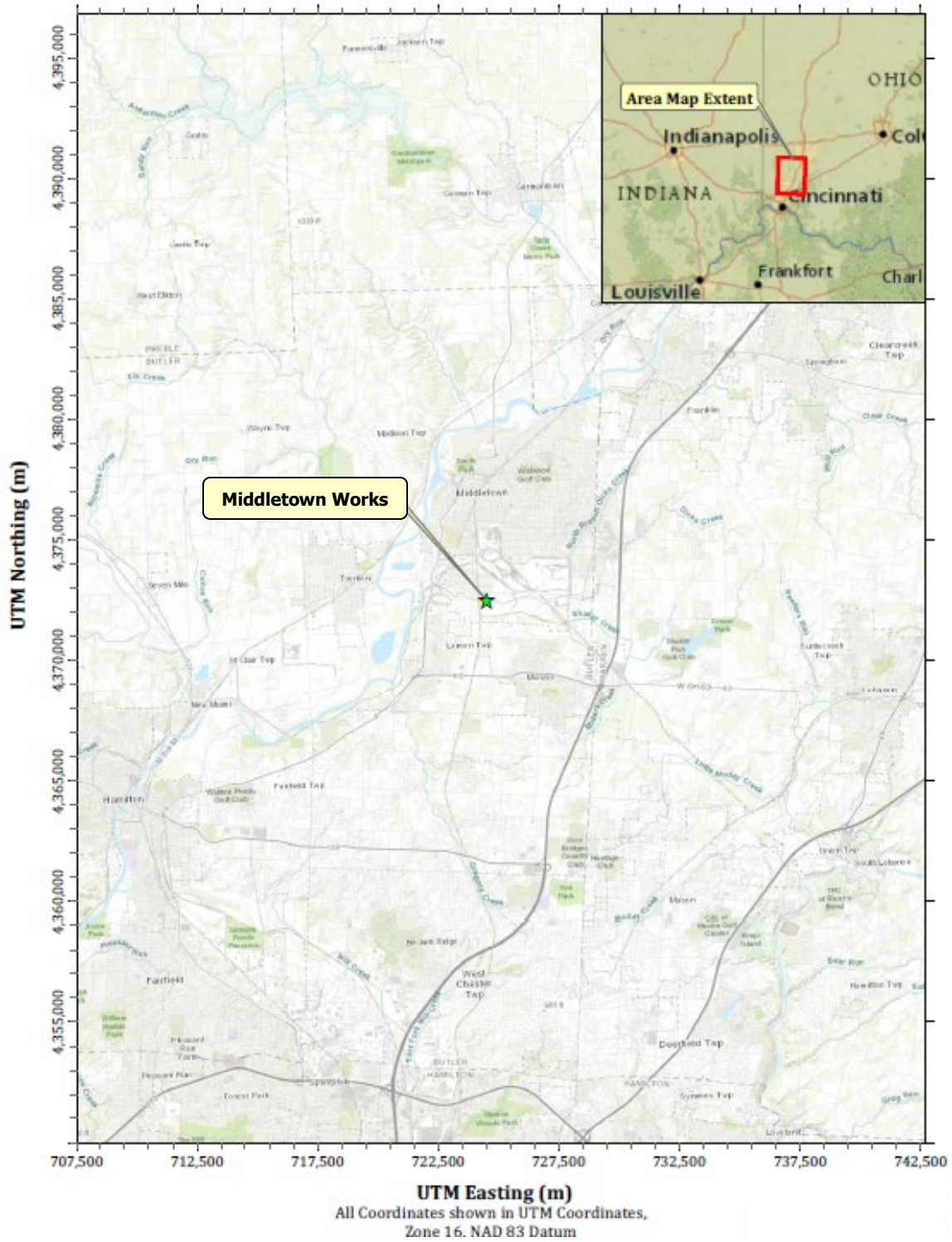
Cleveland-Cliffs (Cliffs) owns and operates a carbon steel manufacturing plant located in Butler County. The facility Cleveland-Cliffs Middletown Works (Cleveland-Cliffs Middletown) is located at 1801 Crawford Street, Middletown, Ohio. **Figure 1-1** is an area map that shows the site location relative to predominant geographical features such as highways and railroads.

The facility currently operates under a Title V operating permit, P0105157, effective October 10, 2017, and expired on October 10, 2022.¹ Further, Cleveland-Cliffs Middletown is an existing major source of VOC emissions and operates non-CTG emission sources with potential VOC emissions more than 100 tpy. Accordingly, the facility is an affected site pursuant to OAC 3745-21-11(A)(2).

USEPA redesignated the Ohio portion of the Cincinnati, Ohio-Kentucky area, including Butler County, as in attainment with the 2015 8-hr NAAQS as noted in a Federal Register notice on June 9, 2022. The Cincinnati area, including Butler County is attainment with the 2015 8-hr NAAQS effective June 9, 2022, as requested by Ohio EPA December 21, 2021, based on quality assured and certified data for 2019-2021 that show the Cincinnati area attained the 2015 NAAQS.

¹ A Title V renewal application was submitted in April 2022, six months prior to the expiration of P0105157.

Figure 1-1. Area Map for Cleveland-Cliffs Middletown Works



2. VOC RACT STUDY APPLICABILITY

Table 2-1 outlines affected non-CTG sources subject to OAC 3745-21-11(B) and their potential VOC emissions. Pursuant to OAC 3745-21-11(B)(5)(a), the application number for the active Title V permit, P0105157, is A0045527. The most recent application number for each of the emission units below is A0070397, which was the Title V renewal application submitted in April 2022.

Table 2-1 Affected Sources Subject to VOC RACT Study²⁻³

OEPA EU ID	OEPA Emission Unit Description	Site Description	VOC PTE (tpy)
B007	211 MMBtu/hr Boiler	Boiler No.1 (No.2 BH)	4.77
B008	211 MMBtu/hr Boiler	Boiler No.4 (No.2 BH)	4.77
B009	211 MMBtu/hr Boiler	Boiler No.3 (No.2 BH)	4.77
B010	211 MMBtu/hr Boiler	Boiler No.2 (No.2 BH)	4.77
B021	63 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	No. 84 Annealing Furnaces	1.49
B022	34 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	Open Coil Annealing Furnaces	0.80
B023	85 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	No. 64 Annealing Furnaces	2.01
B026	136 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	No. 94 Annealing Furnaces	3.21
P009	598 MMBtu/hr Slab Furnace including 320 MMBtu/hr Waste Heat Boiler	No. 3 Slab Reheat Furnace/WHB	21.68
P010	598 MMBtu/hr Slab Furnace including 320 MMBtu/hr Waste Heat Boiler	No. 2 Slab Reheat Furnace/WHB	21.68
P011	598 MMBtu/hr Slab Furnace including 320 MMBtu/hr Waste Heat Boiler	No. 1 Slab Reheat Furnace/WHB	21.68
P012	598 MMBtu/hr Walking Beam Slab Furnace including 320 MMBtu/hr Waste Heat Boiler	No. 4 Slab Reheat Furnace/WHB	17.70
P925	Blast Furnace	No. 3 Blast Furnace	14.05
P019	Aluminum hot dip coating line	No. 4 Coating Line	172.50
P022	Zinc hot dip coating line	No. 3 Coating Line	119.72
P023	Continuous steel pickling line	No. 5 Pickler	41.10
P024	Continuous steel pickling line, with tension leveler	No. 4 Pickler	50.65
P062	Electrogalvanizing line	No. 2 EG Line	470.93
P065	Cold rolling steel mill	No. 3 Cold Mill	99.00
P091	#5 Temper Mill	No. 5 Temper Mill	296.89
P092	#6 Temper Mill	No. 6 Temper Mill	501.08
P093	Corrective rewind line	No. 1 CR Line	18.42
P094	Hot Strip Mill	Hot Strip Mill	10.60

² The above table excludes *de minimis*, insignificant, categorically exempt sources, and sources with very low potential VOC emissions (less than 10 lbs/day VOC) from the detailed engineering study.

³ Coke plant emission units are not considered in this RACT study as the coke plant is was indefinitely idled on September 30, 2021 with no plans for future use.

3. RACT DEFINITION AND METHODOLOGY

“RACT,” “BACT,” and “LAER” are acronyms for different levels of emissions control. The least stringent is RACT, more stringent is BACT, and the most stringent is LAER. The type of control required depends on the size of the stationary source and whether it is located in an attainment or nonattainment area.

- ▶ RACT, or Reasonably Available Control Technology, is required on new minor sources in Ohio and on existing major sources of NO_x and VOC in the ozone NAA.
- ▶ BACT, or Best Available Control Technology, is required for new major stationary sources and major modifications in attainment areas subject to Prevention of Significant Deterioration (PSD) permitting requirements.
- ▶ LAER, or Lowest Achievable Emission Rate, is required for new major stationary sources and major modifications in non-attainment areas subject to Nonattainment New Source Review permitting requirements.

At the federal level, RACT is not defined by statute or rule, rather it is defined in EPA guidance as “the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.”⁴

Considering this definition, RACT involves identifying implementable control technologies with due consideration given to technological and economic feasibility. Since RACT considers the technological and economic impacts of controls, the analysis and determination may differ from source to source and location to location.

3.1 Top-down Approach

In this RACT study, Cleveland-Cliffs is using the U.S. Environmental Protection Agency’s (USEPA’s) top-down approach to determining the feasibility of control technology where the most stringent control available for a similar or identical source or source category is identified. This control option is used to establish the RACT emission limitation, unless the applicant can demonstrate (and the permitting authority agrees) that it is not “achievable” due to technical infeasibility or not being cost effective and potentially having other adverse environmental or energy consequences of implementing the technology. If the top control alternative is eliminated, then the next most stringent level of control is evaluated. This process continues until RACT is selected. The five steps in a top-down RACT evaluation can be summarized as follows:

- ▶ Step 1. Identify all possible control technologies
- ▶ Step 2. Eliminate technically infeasible options
- ▶ Step 3. Rank the technically feasible control technologies based upon emission reduction potential
- ▶ Step 4. Evaluate ranked controls based on energy, environmental, and/or economic considerations
- ▶ Step 5. Select RACT

The following sections contain a description of the five (5) basic steps of this “top-down” approach.

⁴ 44 Fed. Reg. 53762 (9/17/1979)

3.1.1 Step 1 – Identify All Control Options

In this step, available control technologies with the practical potential for application to the emission unit and regulated air pollutant in question are identified. The selected control technologies vary widely depending on the process technology and pollutant being controlled. The application of demonstrated control technologies in other similar source categories to the emission unit in question may also be considered in this step.

The following resources are typically consulted when identifying potential technologies for criteria pollutants:

- ▶ EPA's RACT/BACT/LAER Clearinghouse (RBLC) database
- ▶ NSPS, NESHAP, and RACT regulations for similar operations
- ▶ Engineering experience with similar control applications
- ▶ Information provided by air pollution control equipment vendors with significant market share in the industry

3.1.2 Step 2 – Eliminate Technically Infeasible Options

In this step, "technically infeasible" control options from the list of "potentially available" control options are eliminated. A control option is "technically feasible" if it has been "demonstrated" or if it is both "available" and "applicable."

3.1.3 Step 3 – Rank Remaining Control Options

All remaining technically feasible control options are ranked based on their overall control effectiveness for the pollutant under review. If there is only one remaining option or if all the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not required. Collateral effects are usually not considered until step four of the five step top-down RACT analysis.

3.1.4 Step 4 – Evaluation of Most Effective Control Option

After identifying and ranking available and technically feasible control technologies, the economic, environmental, and energy impacts are evaluated to select the best control option. If collateral impacts do not disqualify the top-ranked option from consideration, it is selected as the basis for the RACT limit. Alternatively, in the judgment of the permitting agency, if economic, environmental, or energy considerations impact the top control option, the next most stringent option is evaluated. This process continues until a control technology is identified. This step validates the suitability of the top control option identified or provides a clear justification as to why the top option should not be selected as RACT.

3.1.5 Step 5 – Select RACT

In the final step, the RACT is determined for each emission unit under review based on evaluations from the previous step.

4. VOC RACT STUDY

4.1 General Facility Information

The information required by sections (1) through (4) of OAC 3745-21-11(B) applies to the facility as a whole and is provided as follows:

- (a) The complete facility name, Ohio EPA air program facility identification number, and address:

Cleveland-Cliffs Middletown Works LLC
1409010006
1801 Crawford Street
Middletown, Ohio 45044

- (b) The name, title, address and telephone number of the owner or operator's representative within the company who is the contact person for this facility regarding the engineering study and affected sources:

Pat Gallo
Area Manager, Environmental Operations Middletown Works
1801 Crawford Street –
Middletown, Ohio 45044
(513) 425-3479

- (c) The name, title, address and telephone number of the official who is responsible for approval of the engineering study:

David Reinhold
Senior General Manager Middletown Works Steelmaking Operations
1801 Crawford Street –
Middletown, Ohio 45044
(513) 425-5000

- (d) The standard industrial classification code and source classification code numbers which are applicable to the facility's operation:

3312
3313

4.2 Required Source Information, VOC Emissions, and Production Rates

Sections (5) through (18) of the VOC RACT study requirements in OAC 3745-21-11 are source specific. The general source information associated with each affected source is outlined in Table 4-1. Table 4-3 shows average and maximum daily as well as annual production rates for each affected source for 2019, 2020, and 2021 (three full calendar years preceding March 2022, effective date of the promulgated VOC regulations).

Table 4-1 – General Information for Affected Sources

OEPA EU ID	Source Description^a	SCC Code Description	SCC Code	Installation Date	Operating Schedule
B007	211 MMBtu/hr Boiler	BFG Combustion NG Combustion	10200704 10300601	6/1/1954	24/7/52
B008	211 MMBtu/hr Boiler	BFG Combustion NG Combustion	10200704 10300601	6/1/1954	24/7/52
B009	211 MMBtu/hr Boiler	BFG Combustion NG Combustion	10200704 10300601	6/1/1954	24/7/52
B010	211 MMBtu/hr Boiler	BFG Combustion NG Combustion	10200704 10300601	6/1/1954	24/7/52
B021	63 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	NG Combustion	10300601	6/1/1965	24/7/52
B022	34 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	NG Combustion	10300601	6/1/1961	24/7/52
B023	85 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	NG Combustion	10300601	6/1/1953	24/7/52
B026	136 MMBtu/hr (combined) indirect-fired natural gas batch annealing furnaces	NG Combustion	10300601	6/1/1969	24/7/52
P009	598 MMBtu/hr Slab Reheat Furnace	COG Combustion NG Combustion	10200707 10300601	6/1/1967	24/7/52
	320 MMBtu/hr Waste Heat Boiler	Steel Reheat	30301599		
P010	598 MMBtu/hr Slab Reheat Furnace	COG Combustion NG Combustion	10200707 10300601	6/1/1967	24/7/52
	320 MMBtu/hr Waste Heat Boiler	Steel Reheat	30301599		
P011	598 MMBtu/hr Slab Reheat Furnace	COG Combustion NG Combustion	10200707 10300601	6/1/1967	24/7/52
	320 MMBtu/hr Waste Heat Boiler	Steel Reheat	30301599		
P012	598 MMBtu/hr Slab Reheat Furnace	COG Combustion NG Combustion	10200707 10300601	3/15/2019	24/7/52
	320 MMBtu/hr Waste Heat Boiler	Steel Reheat	30301599		
P925	No. 3 Blast Furnace	BF: Slip BF: Casting/Tapping BFG Combustion NG Combustion	30301510 30301512 10200704 10300601	6/1/1953	24/7/52

Table 4-2 (continued) – General Information for Affected Sources

OEPA EU ID	Source Description^a	SCC Code Description	SCC Code	Installation Date	Operating Schedule
P019	Aluminum hot dip coating line	NG Combustion Oils: Cleaning/Pretreat	39900601 40201802	2/1/1972	24/7/52
P022	Zinc hot dip coating line	NG Combustion Oils: Cleaning/Pretreat	39900601 40201802	6/1/1959	24/7/52
P023	Continuous steel pickling line	Pickling: Continuous Oils: Cleaning/Pretreat	30301577 40201802	6/1/1968	24/7/52
P024	Continuous steel pickling line, with tension leveler	Pickling: Continuous Oils: Cleaning/Pretreat	30301577 40201802	6/1/1968	24/7/52
P062	Electrogalvanizing line	NG Combustion Oils: Cleaning/Pretreat Zinc Coating	39900601 40201802 30301575	6/1/1995	24/7/52
P065	Cold rolling steel mill	NG Combustion Oils: Cleaning/Pretreat Cold Rolling	39900601 40201802 30301574	6/1/1970	24/7/52
P091	Temper Mill	Oils: Cleaning/Pretreat	40201802	1/1/1956	24/7/52
P092	Temper Mill	Oils: Cleaning/Pretreat	40201802	8/1/1965	24/7/52
P093	Corrective rewind line	Oils: Cleaning/Pretreat	40201802	5/1/1964	24/7/52
P094	Hot Strip Mill	Hot Rolling NG Combustion Oils: Cleaning/Pretreat	30301573 39900601 40201802	6/1/1967	24/7/52

Table 4-3 Average and Maximum Daily and Annual Production Rates

OEPA Emission Unit ID	Production Units	Average Daily Production Rates			Maximum Daily Production Rates			Annual Production Rates		
		2019	2020	2021	2019	2020	2021	2019	2020	2021
B007	MMBtu	3,866	3,726	3,409	5,064	5,064	5,064	1,410,955	1,359,971	1,244,346
B008	MMBtu	3,954	3,744	2,721	5,064	5,064	5,064	1,443,247	1,366,410	993,185
B009	MMBtu	3,741	3,521	3,216	5,064	5,064	5,064	1,365,489	1,285,257	1,173,909
B010	MMBtu	3,206	3,220	3,032	5,064	5,064	5,064	1,170,152	1,175,270	1,106,678
B021	MMBtu	51	146	356	1,512	1,512	1,512	18,668	53,404	129,959
B022	MMBtu	31	35	52	816	816	816	11,271	12,817	19,148
B023	MMBtu	786	609	772	2,040	2,040	2,040	286,845	222,160	281,894
B026	MMBtu	1,685	1,586	1,685	3,264	3,264	3,264	614,916	578,897	614,848
P009	MMBtu	7,224	6,634	8,671	14,352	14,352	14,352	2,636,674	2,421,466	3,165,053
P010	MMBtu	7,920	8,331	9,915	14,352	14,352	14,352	2,890,655	3,040,827	3,619,038
P011	MMBtu	3,247	2,788	7,034	14,352	14,352	14,352	1,184,989	1,017,644	2,567,571
P012	MMBtu	8,579	9,076	8,636	14,352	14,352	14,352	3,131,275	3,312,617	3,152,156
P925	Tons (Steel)	5,986	5,546	5,535	17,760	17,760	17,760	2,184,974	2,024,132	2,020,451
P019	Gals (Oil)	69	44	35	74	58	38	25,019	15,920	12,925
P022	Gals (Oil)	62	65	64	67	75	66	22,597	23,862	23,367
P023	Gals (Oil)	61	63	127	269	246	228	22,207	23,148	46,517
P024	Gals (Oil)	454	371	376	519	487	426	165,847	135,469	137,320
P062	Gals (Oil)	218	147	176	375	322	291	79,622	53,522	64,203
P065	Tons (Steel)	5,278	4,314	5,114	8,739	8,607	7,717	1,926,293	1,574,667	1,866,539
P091	Gals (Oil)	344	428	305	2,697	2,780	1,769	125,503	156,350	111,242
P092	Gals (Oil)	490	411	661	944	897	1,180	178,777	149,895	241,330
P093	Gals (Oil)	24	18	26	163	18	195	8,644	6,415	9,643
P094	Gals (Oil)	2	64	2	3	71	2	864	23,328	648

Pursuant to OAC 3745-21-11(B)(6), a plot plan showing the general layout of the facility and the affected sources is presented in Appendix A. The average and maximum daily as well as annual VOC emissions for each affected source, pursuant to OAC 3745-21-11(B)(7), are presented in Table 4-4. The average and maximum daily VOC emissions (lbs/day) are based on the highest average and maximum daily production rates for each of the three full calendar years preceding 2022 (effective date of this rule). Further, annual VOC emissions (tons per year) are determined based on the highest annual production rates for 2019, 2020, and 2021.

Table 4-4 Average and Maximum Daily and Annual VOC Emissions

OEPA Emission Unit ID	Average Daily VOC Emissions (lb/day)	Maximum Daily VOC Emissions (lb/day)	Annual VOC Emissions^a (tpy)
B007	5.0	6.9	0.9
B008	5.1	6.5	0.9
B009	4.9	7.0	0.9
B010	5.0	7.8	0.9
B021	1.8	8.1	0.3
B022	0.3	4.3	0.1
B023	4.2	11.0	0.8
B026	9.1	17.6	1.7
P009	42.7	70.7	7.8
P010	51.5	74.6	9.4
P011	35.1	73.3	6.4
P012	45.5	73.8	8.3
P925	65.9	265.0	15.5
P019	40.3	43.3	7.4
P022	43.4	47.3	7.9
P023	12.5	33.0	2.3
P024	62.2	71.1	11.4
P062	74.8	128.6	13.7
P065	1.9	3.1	0.3
P091	657.1	4,263.8	119.9
P092	751.5	1,340.7	137.1
P093	7.6	56.1	1.4
P094	10.2	11.4	1.9

^a There are no add-on VOC control devices at Middletown Works

4.3 Coating, Pickling, Electro galvanizing, and Rolling Mills

VOC emissions from coating, pickling, electro galvanizing, and rolling mills (EUs P019, P022-24, P062, P065, P091-94) result from the application and use of rolling oils, anti-rust and anti-galling oils, lubrication/pre-lubrication oils during operations as well as fugitive losses during oil storage and transport. The low VOC-containing oils employed by Cleveland-Cliffs serve two purposes. First, there are customized engineered oils that are necessary in the steel rolling process such as at the hot rolling mill and the cold rolling mill. These oils are customized to each unique rolling mill and are used to avoid "metal on metal" from the rolls and the steel strip, ensuring proper mechanical function of the rolling mills. Second, there are oils that serve a purpose for the final steel provided to the customer, such as rust prevention, and pre-lubrication for downstream processing. The properties and specifications of these oils are dictated ultimately by the customer of the steel (e.g., an automobile manufacturer). The specific oil is essentially a part of the steel product and is subject to rigorous certifications by the customer. Due to the customer dictating the specification for these oils, Cleveland-Cliffs does not have direct control over what oil is used and, therefore, must have the operational flexibility to alter formulations to meet customer quality and demand specifications.

VOC content limitations for the metal coil treatment operations at Cleveland-Cliffs Middletown have been required since May 25, 1988, when a site-specific revision to OAC 3745-21-09(OO) was published incorporating the conclusion of a prior RACT evaluation. The following VOC content limitations were determined under OAC 3745-21-10(B):

- (1) The VOC content of any rolling oil employed in the temper mills shall not exceed 6.9 pounds of VOC per gallon of oil, excluding water and exempt solvents.
- (2) The VOC content of any rust preventive oil employed in the temper mills, shears, corrective rewinds, slitters, coating lines, and the pickle lines shall not exceed 3.3 pounds of VOC per gallon of oil, excluding water and exempt solvents.
- (3) The VOC content of any anti-galling material employed in the aluminum coating operation shall not exceed 1.2 pounds of VOC per gallon of material, excluding water and exempt solvents.
- (4) The VOC content of any pre-lube oil employed at the facility shall not exceed 0.8 pound of VOC per gallon of oil, excluding water and exempt solvents.

However, pursuant to Ohio EPA guidance, site-specific RACT must be assessed in this report to determine whether the site-specific conditions still represent RACT for the 2015 ozone NAAQS. Thus, the section below outlines a review of potentially applicable VOC control technologies pursuant to OAC 3745-21-11(B)(8) for these sources operating at Cleveland-Cliffs Middletown.

4.3.1 VOC Emissions

Cleveland-Cliffs has provided additional information below regarding VOC emissions pursuant to OAC 3745-21-11(B)(7)(d)-(h):

- (d) *General composition of the VOC emissions.*
Generally, the VOC emissions are light distillates (e.g., mineral oil, solvent naphtha, etc.)
- (e) *If coating materials are used in the source, the company identification and formulation of each coating [VOC content (pounds per gallon of coating and pounds per gallon of coating, excluding water), water*

content (per cent by volume), solids content (per cent by volume), and exempt organics content (per cent by volume)].

Refer to the safety data sheets (SDS) in Appendix D.

- (f) *Composition, density and quantity (pounds per day of operation and tons per year) of any clean-up solvents which were employed during the calendar year.*

No clean-up solvents are used during routine processing.

- (g) *Documentation of the efficiency of the existing control equipment.*

No existing control equipment.

- (h) *Documentation of any emissions testing which has been performed.*

No VOC emissions testing.

4.3.2 VOC Control Technologies

Step 1 of the RACT analysis is to identify all generally available control options. Pursuant to OAC 3745-21-11(B)(8), at least five control technologies must be evaluated to determine the technical and/or economic feasibility of employing each of the control measures for all affected sources. The discussion below combines site-specific knowledge of the Cleveland-Cliffs Middletown facility with general industry knowledge referenced in the "Control of VOC Emissions from Nonferrous Metal Rolling Processes" document from the U.S. EPA's Office of Air Quality Planning and Standards (OAQPS).

In general, these emission units are fugitive sources of emissions. In instances in which the VOC emissions are generated in a localized area (e.g., the temper mill), it may be possible to install capture hoods to route emissions to a control device. Additional engineering studies would be necessary to fully plan for every possible contingency to ensure that capture hoods would not inhibit the safe production of on-specification material due to crane clearance, maintenance needs, emergency access, etc. However, for the reasons stated in the follow sub-sections, pulling low-temperature emission streams with substantial amounts of fresh air to an add-on control device is not a technically feasible alternative to the VOC limitations previously established in OAC 3745-21-09(OO).

Note that the assessments included herein were conducted independently of past RACT analyses using the most up-to-date research, information, and operator knowledge available to make determinations about the feasibility and, where applicable, cost effectiveness of various control devices for the applications discussed in this section.

4.3.2.1 Refrigerated Condenser

Refrigerated condensers are generally applicable to traditional VOC gas stream sources, not steel industry rolling mills and related VOC sources. Accordingly, this control technique is not applicable for the operations at Cleveland-Cliffs Middletown and therefore no further evaluation was performed. Additionally, the presence of water vapor and heavy oils results in condenser surface fouling due to the formation of emulsions. The technology is typically not used where high molecular weight organics are present.

4.3.2.2 Catalytic Incinerator (with and without heat recovery)

Catalytic incineration/oxidation is an enhanced thermal oxidation process that allows relatively low temperature combustion of VOC. This combustion is accomplished by passing combustion gases over a

specialized catalyst, where the VOC is converted to CO₂. The optimal working temperature range for oxidation catalysts is approximately 850-1,100 °F with a minimum exhaust gas stream temperature of 500 °F for minimally acceptable control. In order to install an oxidation catalyst at the Cleveland-Cliffs Middletown rolling mills and related operations, the outlet stream temperature will need to be heated to approximately 500 °F. Catalytic incineration would be ineffective when used with rolling mills and related operations and poses significant safety concerns. Catalytic incineration requires consistently high VOC concentration, continuous operation and thus fuel burning, and poses potential explosion danger in the event of VOC buildup. The presence of chlorides and other alkali species can poison the catalyst reducing the destruction efficiency and life. Consequently, catalytic incineration is not a viable control technology for these operations. This type of system is also not listed in the RBLC for mills. Therefore, catalytic incineration is not a reasonable control option and considered to be technically infeasible for RACT purposes.

4.3.2.3 Thermal Incinerator (with and without heat recovery)

Incineration removes VOCs from a vapor stream after being collected by a fume exhaust hood. Through combustion, the VOCs are converted into carbon dioxide, water vapor and small quantities of other compounds. In thermal incineration, the emission stream passes through a combustion chamber where a natural gas-fueled flame ignites the VOCs in the vapor stream. The thermal incinerator may require supplemental fuel in order to continuously operate when the vent stream is not being sent to the incinerator or when the vapor stream VOC concentration is too variable for self-sustained ignition.

Thermal oxidation requires temperatures of approximately 1,300 °F to achieve 90 to 95 percent conversion of VOC to CO₂. The performance of the incinerator/oxidizer is dependent on the waste gas heating value, inert content, waste gas moisture content, and the amount of excess combustion air. The exhaust temperature for the referenced emission units is generally near ambient, significantly lower than the required temperature for thermal incineration. Accordingly, excessive measures would need to be implemented in order to reheat the gases to the necessary temperature range in order for thermal oxidation to occur. Furthermore, rolling mill emissions have high water content in the waste vapor stream and inconsistent VOC concentrations in the vapor stream. Thermal incinerators require high VOC concentrations to sustain combustion reactions; therefore, the low concentration characteristic of the rolling operations would require significant supplemental fuel usage in order to maintain continuous incinerator operation at an effective temperature. Additionally, oils are used in varying cycle times throughout these processes but the incinerator would have to be run continuously in order to avoid the lengthy and energy intensive process of startup and shutdown. The supplemental fuel usage required for continuous incinerator operation would unnecessarily increase nitrogen oxide emissions, while not substantially reducing VOC emissions. Additionally, if the incinerator fuel is not completely burned, excess VOC emissions could result from incomplete fuel combustion. This could potentially result in net VOC emissions increase for the EUs and incinerator.

Additionally, these types of systems are not listed in the RBLC for rolling mills and related operations. Therefore, thermal incineration is not a reasonable control option and therefore considered to be technically infeasible for RACT purposes.

4.3.2.4 Carbon Adsorbers (with and without the recovery of organic compounds)

Adsorption is a non-chemical process that bonds gaseous molecules to other surfaces by means of Van der Waals forces. The carbon adsorption process occurs after the VOC emission streams have been collected by the fume exhaust hoods. The VOC emissions stream passes through a bed of activated carbon. Here, the VOCs are adsorbed by the carbon until the VOC capacity of the carbon bed is reached. The adsorptive capacity of the carbon bed tends to increase with parameters such as gas phase VOC concentration,

molecular weight, diffusivity, polarity, and boiling point of the VOC. Upon reaching capacity in the carbon bed, the VOCs can be desorbed and recycled for further use or incinerated. The desorption process is conducted by passing a low-pressure steam through the carbon bed. As the steam passes, the VOCs are released from the carbon and condensed in the steam, creating VOC-laden water.

Carbon adsorption can be employed in two forms: fixed-bed adsorption and fluidized-bed adsorption. Fixed-bed carbon adsorption uses two or more carbon beds. While two or more beds are in regeneration, one bed is in use. Fluidized-bed adsorption employs a single bed that contains beaded activated carbon. The VOC stream is pushed through the bed of beaded activated carbon and exits while the VOC-laden carbon is continually removed and replaced for regeneration.

Carbon adsorbers exhibit some disadvantages with certain types of VOCs such as those which are difficult to strip from carbon or those which are miscible with water (such as emulsions). Also, carbon adsorption is relatively sensitive to emission stream humidity and temperature. Dehumidification is necessary if the emission stream has a high relative humidity (greater than 50%) and cooling may be required if the emission stream temperature exceeds 120 to 130°F. Current literature searches yielded no evidence of carbon adsorption systems existing as control devices for these types of emission sources. It is expected that the streams would rapidly foul the carbon adsorption bed because of the heavy lubricant compounds in the vapor stream. The VOC-laden carbon would either take significant energy use for desorption, or carbon bed replacement would have to occur frequently. In addition, there are several inherent design concerns with the application of carbon units to rolling mill emission streams, including high levels of aerosol or liquid entrainment, desorption problems, and heel removal. Carbon capture is not recommended for organic species with a molecular weight greater than 130. The emission would contain a mixture of organics which would foul the carbon pours and reduce the working volume causing rapid cycling during regeneration.

Carbon adsorption is not applicable as an emission control technology because there is a high potential for bed fouling, and the beds would require additional control equipment (dehumidifiers and heaters) in order to be fully effective. Further, these types of systems are not listed in the RBLC for these types of sources in the steel industry. Therefore, this technology is not a reasonable control option for these emission units and therefore considered to be technically infeasible for RACT purposes.

4.3.2.5 Scrubber

The scrubbing process also occurs after the fume exhaust hoods and involves removing VOCs from the emission stream. In this process, the VOCs are removed from the exhaust by adsorption in a liquid solvent such as a high molecular weight oil. The vapor stream is introduced to a scrubber system screen tray column that has a countercurrent of absorber oil. The VOC-laden vapor stream is directed into the scrubber system, where the VOCs are absorbed upon contact with the absorber oil. After the vapor stream passes through all the impingement trays in the scrubber, the cleaned gas is exhausted, and the lubricant laden absorber oil moves to a continuous vacuum distillation system. The vacuum distillation system separates the lubricant from the absorber oil. The separated lubricant can be condensed in a heat exchanger and recycled, while the absorber oil can also be recycled back into the scrubber system.

Typically, absorption systems are applicable for VOC concentrations from 250 to 10,000 ppmv and can achieve a control efficiency ranging from 86 – 99% depending on the application and numerous operating variables. A major disadvantage to the oil absorption system is the deterioration in recovered lubricant because absorption reduces the amount of lubricant additives, therefore oil reformulation must be performed, adding another step to the process. Finally, severe retrofit problems arise when considering an oil absorption system for VOC control. Sufficient size and space areas must be located for hooding,

ductwork, control device and support structures. Some of these units may be taller (up to 60 feet) than the rolling plant they were designed to control.

Oil absorption scrubbing technology has not been demonstrated on these types of EUs. The high-water content in the lubricant would likely emulsify the heavy absorption oil in the scrubber. In order to recycle the heavy oil and separate captured VOCs, the mixture would have to be demulsified. Demulsifying would be complicated by the variable water content of the waste gas. In addition, these types of systems are not listed in the RBLC for these types of EUs. Accordingly, absorption (scrubbing) technology is not a reasonable control option and therefore considered to be technically infeasible for RACT purposes.

4.3.2.6 Mist Eliminator

Pursuant to OAC 3745-21-11(B)(8)(f), affected facilities can evaluate any other RACT alternatives not listed in paragraph (B)(8) of this rule that may be applicable to an affected source. Mist eliminators remove visible or entrained oil vapor, moisture, and VOC mist (mostly considered to be particulate matter greater than 10 microns in diameter) from the gaseous stream of processes when liquid droplets come in contact with the wire mesh surface/pad or filter. The liquids present in the gas stream are separated by either diffusion, impaction, or interception and are then collected, filtered and sent to a storage tank. They work effectively with gas streams of velocities above 1 ft/s and remove entrained liquid drops down to 3 µm in diameter.

While controlling the “mist” of oil (i.e., opacity), when present, mist eliminators do not generally reduce VOC emissions of these types of emission sources. Furthermore, high molecular weight oils may blind the filter (or pre-filters), choking off air and/or causing channeling/ bypass or premature change-out of the filter media. Accordingly, mist eliminators are not a reasonable control option and therefore considered to be technically infeasible for RACT purposes.

4.3.2.7 Process Modification

In accordance with OAC 3745-21-11(B)(10) and OAC 3745-21-11(B)(11), potential process modification was evaluated. Specifically, Cliffs evaluated whether a further decrease in the VOC content limitations specified in the site-specific requirements of OAC 3745-21-09(OO) were technically feasible. The operations in EUs P019, P022-24, P062, P065, P091-94 require various oils depending on operating conditions and desired metal specifications. The oils, their VOC content, and their corresponding VOC limit from OAC 3745-21-09(OO) are provided in Table 4-5 below. The VOC content is also provided in the SDS and/or analytical test data provided in Appendix D.

Table 4-5. Oil VOC Content at Middletown Works

Category ^a --	VOC Limit ^a lb VOC/gal	Oil Identifier --	VOC Content ^b lb VOC/gal	Unique to MW ^c Y/N	Low-VOC Alternative in Marketplace? --
Rolling Oil	6.9	Quaker TH Oil	3.87 / 1.14 ^d	Y	n/a
		AKM-163 (EVEROLL S 1163 OM)	0.101 ^e	Y	n/a
		TM-98 AKM (EVERPASS 1198 OM)	0.10	Y	n/a
		Quakerol HB-15-AK	0.16	Y	n/a
Rust Preventive Oil	3.3	FC 61 (blended on-site)	0.99 ^f	Y ^g	Alternative may be available
		K6 (blended on-site)	1.69 ^f	Y ^g	Alternative may be available
		Ferrocote 722	2.75	N	No; low-use edge sealer
		Ferrocote EGL-1-EG	0.47	Y	n/a
Anti-Galling Material	1.2	UL MP-16	0.12	Y	n/a
Prelube Oil	0.8	Metalub PL7105A	0.083	N	No; near-negligible VOC
		Ferrocote 61 MAL HCL 1	0.23	N	Automotive specification; considered low-VOC

^a As stated in 3745-21-09(OO)

^b Unless stated otherwise, the method for VOC content determination is Method 24.

^c If this oil is made to specifically be used in a Middletown Works process, the assumption is that there is not a viable alternative in the marketplace.

^d 3.87 is the VOC content based on Method 24 analysis; 1.14 lb VOC/gal is VOC content using ASTM E-1868-10 at operating temperature (130 deg F).

^e Method 24 performed by QH

^f Highest single analytical sample in provided analytical report

^g The components of the mixtures are not unique to Middletown Works; however, the specific blend is produced to meeting Middletown Works equipment/product specifications.

As shown in the table, these emission units already use oils that are lower-VOC (or much lower-VOC) than their respective OAC 3745-21-09(OO) limits. Cleveland-Cliffs and its primary oils supplier, Quaker Houghton, are generally committed to using the lowest VOC content materials available that allow Cleveland-Cliffs to make on-specification steel on the available equipment in a safe manner. The decreases in VOC content from the implementation of the original limits 35 years ago to today were driven primarily by availability of product and the necessity to meet customer specifications.

Cleveland-Cliffs requested that Quaker Houghton perform an assessment as to the current oils being used across the facility and determine whether there are potential alternatives that would decrease VOC emissions. Quaker Houghton’s letter is attached as Appendix F. In summary, two of the eleven oils presented in Table 4-5 have an option for a potential alternative. It should be noted that, as stated in the letter, Quaker Houghton cannot currently attest to whether or not the alternatives are technically feasible. In order to determine whether these alternatives are technically feasible, Cleveland-Cliffs would have to conduct testing and/or engineering analysis that would be either cost-prohibitive or not possible. Additional details are provided below:

- ▶ As it relates to the oils that serve the purpose of proper operation of the rolling mill, it is not feasible to simply test-run a new oil and see if it achieves the necessary mechanical functions. In a rolling mill, the steel strip is under a tremendous amount of pressure. Improper oils can result in a malfunction of the mill, which could include the steel strip ejecting from the mill. This is an unacceptable safety hazard, in addition to the potential for catastrophic damage to the mills, as well as catastrophic damage to the process equipment. Extensive bench-scale testing would be necessary first, before any effort to actually use the oil in the mill. Such economic impact is not warranted for these low VOC oils.
 - Furthermore, Cleveland-Cliffs’ supplier, Quaker Houghton, did not identify any lower VOC alternatives per their assessment provided in Appendix F and described above.
- ▶ As it relates to the oils that are essentially part of the steel product, those oils are selected by customers based on their specifications. Cleveland-Cliffs does not have control over the selection of the oil applied to the steel. Any potential change is only authorized by the customer, and would involve demanding, time-consuming, and expensive certification testing as required by the customer. Such economic impact is not warranted.

4.3.3 Economic Feasibility of Technically Feasible Control Technologies

As discussed in the preceding justification, Cleveland-Cliffs cannot conclusively say whether the alternatives suggested as potential options by Quaker Houghton are technically feasible. However, Cleveland-Cliffs did perform a simplified economic analysis of the cost-effectiveness of switching to the potential alternatives. This information is provided in Table 4-6 below. The cost-effectiveness values presented in the table are high when considering only the cost to pay for more expensive oils. However, these costs do not include the cost for actually determining whether the oils are technically feasible as described in the preceding section. Cleveland-Cliffs estimates that the cost to run the necessary trials, if given permission by its customer(s), would be significantly higher than the costs presented in the table.

Table 4-6 Cost-Effectiveness of Potential Oil Alternatives

Oil for Replacement	Parameter	Current	Ferrocote 61 A US
K6 (blended on-site)	VOC Content	1.69	0.44
	Price (\$/gal)	\$6.81	\$10.95
	Cost-Effectiveness ^a (\$/ton VOC "removed")	\$6,624.00	
Oil for Replacement	Parameter	Current	EGL-1-EG
FC 61 (blended on-site)	VOC Content	0.99	0.47
	Price (\$/gal)	\$9.58	\$12.14
	Cost-Effectiveness ^a (\$/ton VOC "removed")	\$9,846.15	

^a Cost effectiveness is calculated as 2,000 lb VOC/ton VOC / lb VOC/gal (current - alternative) x \$/gas (alternative - current) = \$/ton VOC

It should be noted that even if the oils were determined to be technically feasible and also deemed cost-effective, this would not affect the current limit for rust preventative oils of 3.3 lb VOC/gal. K6 and FC 61 blends are not the highest VOC content materials in this category, but they are the only two oils that have a potentially viable alternative.

4.3.4 Proposed VOC RACT Determination

Based on the technical information included in this report, Cleveland-Cliffs asserts that retention of the existing VOC RACT emission limits in OAC 3745-21-09(OO) is proper, and that it would be unreasonable to lower the limits, even though Cleveland-Cliffs is currently using oils with much lower VOC content. Several reasons support this conclusion:

- ▶ First, Cleveland-Cliffs must maintain the flexibility to use other oils if its primary oil supplier can no longer service the company's needs. If RACT limits were set at the VOC content of the existing oils being used, then that would essentially restrict Cleveland-Cliffs to using only that oil. If the supplier can no longer provide that oil, then Cleveland-Cliffs may not be able to find a suitable replacement with the same VOC content.
- ▶ Second, unreasonably lowering the VOC RACT limit would likewise restrict potential competition and the ability to use other suppliers even if the current supplier is able to produce the oil. This could give the current supplier essentially a monopoly in providing a customer-demanded oil specification, thus limiting competition in the free marketplace and impacting the competitive bidding process.
- ▶ Third, Cleveland-Cliffs must be able to be responsive to customer specifications and preserve operational flexibility to change oil formulations and specifications [within the limits established by OAC 3745-21-

09(OO)]. As noted above, many of these oils are part of the steel product sold to customers. Unnecessarily restricting the oil type or VOC content could impact Cleveland-Cliffs ability to produce and sell its product.

- ▶ Finally, there is inherent variability in VOC content testing. Establishing a VOC content limit that is too restrictive could result in the inability to use otherwise compliant oils due solely to methodology issues.

Thus, Cleveland-Cliffs proposes the following VOC RACT limits. Note that the only revision to the existing limits is a lower rolling oil limitation and an alternative test method, which is further discussed in the subsequent sub-section.

- (1) The VOC content of any rolling oil employed in the temper mills shall not exceed 4.6 pounds of VOC per gallon of oil, excluding water and exempt solvents.
- (2) The VOC content of any rust preventive oil employed in the temper mills, shears, corrective rewinds, slitters, coating lines, and the pickle lines shall not exceed 3.3 pounds of VOC per gallon of oil, excluding water and exempt solvents.
- (3) The VOC content of any anti-galling material employed in the aluminum coating operation shall not exceed 1.2 pounds of VOC per gallon of material, excluding water and exempt solvents.
- (4) The VOC content of any pre-lube oil employed at the facility shall not exceed 0.8 pound of VOC per gallon of oil, excluding water and exempt solvents.

The VOC contents described above shall be determined using the methods provided in OAC 3745-21-10 or, as an alternative, ASTM E 1868-10 at actual operating temperature for each oil category.

4.3.4.1 Alternative Test Method

With this revision to the existing VOC RACT limit proposed above, Cleveland-Cliffs is also requesting an alternative test method to Method 24, which is required for “coatings” pursuant to OAC 3745-21-10(B)(4). The oils referenced above are referred to as coatings for RACT compliance despite not functioning in the same manner as the coatings referred to in the definition in OAC 3745-21-01(D)(50) as a “... material applied onto or saturated within a substrate for decorative, protective or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, adhesives and inks.” In Method 24, a known amount of oil is initially weighed. The sample is then baked at 230 degrees Fahrenheit (°F) for one hour. The sample is then reweighed with any loss of mass assumed to be VOC.

The processes that the various oils at Cleveland-Cliffs Middletown, however, operate at lower temperatures. For example, rolling oils are applied in processes that operate at approximately 130°F. Furthermore, the oils are intended to remain on the steel substrate as a lubricant as opposed to “drying” as a paint, ink, adhesive, or other traditional coating. Thus, Method 24 overestimates the amount of oil lost as VOC. Cleveland-Cliffs’ chemical supplier, Quaker Houghton, recommends using an alternative test method and doing so at actual operating temperatures. ASTM E 1868-10 is approved for determining VOC content from similar oil applications on metals by regulatory bodies such as the South Coast AQMD and Ventura County APCD.^{5,6}

⁵ <https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1144.pdf>

⁶ <https://ww2.arb.ca.gov/sites/default/files/classic/technology-clearinghouse/rules/RuleID4142.pdf>

4.4 Combustion Sources

4.4.1 Combustion Sources (Excluding Blast Furnace Casthouse)

The RBLC database was queried to identify VOC controls for similar sized combustion sources (boilers, reheat furnaces, annealing furnaces, blast furnaces, basic oxygen furnaces (BOFs), walking beam furnace, and slab casters). The RBLC search results are shown in Appendix C. As shown in Appendix C, there have been no add-on control devices for the control of VOC emissions from these types of combustion sources. In numerous cases of similar sources, VOC BACT has been determined to be "good combustion practices". Further, VOC emissions from these sources, as shown in Table 4-4, are too low (generally less than 10 tpy) for any add-on controls to be economically feasible.

4.4.2 Additional RACT Determinations for the Blast Furnace Casthouse

The annual emissions from the No. 3 Blast Furnace (BF), EU P925, are greater than 10 tpy due to a contribution of non-combustion emissions from the BF casthouse. The collected exhaust gases from the BF casthouse contain a high loading of particulate matter which are removed at approximately 99% by the No. 3 Blast Furnace Casthouse Baghouse prior to venting to the atmosphere. Particulate removal is necessary prior to any of the VOC control devices described herein. Therefore, a VOC control device would be added downstream of the No. 3 Blast Furnace Casthouse Baghouse. Combustion emissions are not exhausted through the same stack as the casthouse emissions; therefore, the combustion emissions are excluded from the discussion in this section.

4.4.3 VOC Emissions

Cleveland-Cliffs has provided additional information below regarding VOC emissions pursuant to OAC 3745-21-11(B)(7)(d)-(h):

(d) General composition of the VOC emissions.

The composition of VOC emissions from the casthouse is unknown. Based on the most recent testing from the casthouse at the Cleveland-Cliffs Dearborn Works facility in Dearborn, MI, the vent gas from the casthouse is 2.0 parts per million (ppm) VOC (refer to Appendix E). The Method 25A test does not determine individual VOC components. Furthermore, Cleveland-Cliffs is not aware of any site-specific or industry-specific knowledge regarding how or why VOC is generated in small amounts in this area of the casthouse. Therefore, Cleveland-Cliffs is unable to provide the VOC composition of the vent gas from the casthouse.

(e) If coating materials are used in the source, the company identification and formulation of each coating [VOC content (pounds per gallon of coating and pounds per gallon of coating, excluding water), water content (per cent by volume), solids content (per cent by volume), and exempt organics content (per cent by volume)].

No coatings are used in this process.

(f) Composition, density and quantity (pounds per day of operation and tons per year) of any clean-up solvents which were employed during the calendar year.

No clean-up solvents are used during routine processing.

(g) *Documentation of the efficiency of the existing control equipment.*

No existing control equipment.

(h) *Documentation of any emissions testing which has been performed.*

No VOC emissions testing.

4.4.4 VOC Control Technologies

Pursuant to OAC 3745-21-11(B)(8), at least five control technologies must be evaluated to determine the technical and/or economic feasibility of employing each of the control measures for all affected sources. The detailed discussions of various control devices are provided in Section 3.3. and the general justifications for infeasibility also apply to the casthouse emissions; thus, only 5 control devices that could potentially be feasible control devices are discussed in this section.

Technically Feasible

Thermal and catalytic incineration of the casthouse emissions are not typically applied to vent streams with low VOC concentrations due to the necessity of constant supplemental fuel, as discussed previously. The VOC content of the casthouse stack is less than 10 ppmv based on testing from similar Cleveland-Cliffs sources used to establish the current VOC emission factor. However, since emissions are vented through a baghouse with a dedicated stack, thermal and catalytic incineration are considered technically feasible for purposes of this analysis and are further discussed below.

Technically Infeasible

- ▶ Carbon adsorption is not technically feasible for controlling the cast-house VOC emissions. Carbon adsorption is most effective at low temperatures (less than 130 °F);⁷ therefore, the casthouse exhaust gases (150 °F) would be too hot for effective removal without the addition of a dilution air system which would further increase flow and drop the inlet concentration. According to U.S. EPA, activated carbon is less effective in situations in which the vent stream has high relative humidity (i.e., high moisture content) as the water molecules readily adsorb to the activated carbon reducing the number of available adsorption sites and promote biological growth on the carbon surface. The U.S. EPA report states that “if the VOC inlet concentration is below 1,000 ppm or the relative humidity is above 50%, then the moisture begins to compete with the adsorbate for the available adsorption sites.”⁸ As noted above, the casthouse exhaust is expected to be at approximately 2.0 ppm. Additionally, for the reasons stated in the preceding section regarding combustion emissions, carbon adsorbers would likely foul quickly and require intensive energy to regenerate for this type of application. Finally, the steel industry has flammability concerns. Carbon adsorbers have an inherent risk for carbon bed fires and explosions.
- ▶ Condensation of the VOC from the casthouse is not feasible because of the low inlet concentration and high flow. Use of condensation as a VOC emission control device is typical only for sources which contain a VOC concentration greater than 5,000 ppm and flowrate lower than 2,000 acfm.¹ The subject source exhaust stream is so dilute that chilling temperatures will need to be impractically low. The low-temperature chiller could cause the moisture carried in the air stream to condense. This moisture would cause the heat exchanger to freeze, plugging the tubes. Condensation is therefore technically infeasible for this source.
- ▶ Finally, absorption is not feasible for this source because the concentration is so dilute that an impractically tall tower would be required. For concentrations near the bottom of typical absorption

⁷ U.S. EPA Handbook: *Control Technologies for Hazardous Air Pollutants*. EP A/625/6-91/014. June 1991.

⁸ https://www.epa.gov/sites/default/files/2018-10/documents/final_carbonadsorberschapter_7thedition.pdf

range (i.e., 250 ppm), absorbers are typically only effective "... when they are used in combination with other control devices such as incinerators or carbon adsorbers."²

OAC 3745-21-11(B)(9)-(18)

(9) For each type of control measure that is determined to be technically feasible, an estimate of the control efficiency that can be achieved.

Because the inlet VOC concentration is very low (less than 10 ppmv), a high removal efficiency will be difficult to achieve. An efficiency of 90 percent is assumed for these systems.

(10) If coating materials are used in an affected source, a detailed discussion of the technical feasibility of converting to waterborne, high-solids or powder coatings to minimize or eliminate the VOC emissions (statements from several major coating suppliers should be obtained to document the conclusions).

Various oils are used in processes discussed elsewhere in this report. However, these do not meet regulatory definitions of "coatings" and, consequently, are not addressed here.

(11) A detailed discussion of the technical feasibility of modifying or replacing the source in order to minimize or eliminate the VOC emissions.

The BF casthouse is an integral component to BF operation, and VOC emissions are an inherent aspect of the process.

(12) A quantification of the VOC emission reductions that could be achieved, at the production rates for the calendar year, by each control option that is determined to be technically feasible.

Annual emissions from the BF casthouse and associated estimated emissions reductions are provided below. These values are valid for either the thermal incinerator or catalytic incinerator. Note that combustion emissions are excluded.

Table 4-5. P925 Potential Emissions Reductions

Emission Unit --	Year --	Annual Production tpy	Emission Factor lb/ton	Annual Emissions tpy	Estimated Control %,ctrl	Emissions Reduction tpy
P925 (Casthouse)	2019	2,184,974	0.011	+12.02	90%	-10.82
	2020	2,024,132		+11.13		-10.02
	2021	2,020,451		+11.11		-10.00

(13) For each control option that is determined to be technically feasible, an estimate of the capital cost, annualized cost (including capital and operating costs), and the cost-effectiveness (annual dollars per ton of VOC removed annually).

An estimate of the capital cost, annualized cost (including capital and operating costs), and the cost-effectiveness (annual dollars per ton of VOC removed annually) for the emissions for the BF casthouse are provided in the table below.

Table 4-6. Cost-Effectiveness for Technically Feasible Control Devices

Emission Unit --	Control Device --	Capital Cost \$	Annualized Cost \$	Cost-Effectiveness \$/ton
P925 (Casthouse Only)	Catalytic Oxidizer (fixed bed; 70% HR)	\$6,047,019	\$6,271,418	\$195,416
	Catalytic Oxidizer (fixed bed; no HR)	\$4,343,821	\$14,044,915	\$437,702
	Recup. Thermal Oxidizer (70% HR)	\$2,062,703	\$10,321,874	\$321,675
	Recup. Thermal Oxidizer (no HR)	\$834,614	\$26,393,195	\$822,528
	Regen. Thermal Oxidizer (70% HR)	\$12,005,498	\$3,502,417	\$109,151

(14) A comparison and discussion of the advantages and disadvantages of control options that are determined to be technically feasible.

The oxidizers above have no inherent advantages or disadvantages beyond the cost-effectiveness determinations stated in item (13) above.

(15) A recommended definition of RACT for the source, including one or more of the following:

- (a) Enforceable production limitations*
- (b) Emissions limitations*
- (c) Control efficiencies*
- (d) Operating requirements*

Refer to Section 4.4.5.

(16) An expeditious schedule for implementing the recommended definition of RACT, including milestones for awarding contracts, initiating construction, completing construction, and performing emissions testing, if necessary, to demonstrate compliance with the approved definition of RACT.

Refer to Section 4.4.5.

(17) Clean and detailed documentation of all calculations of the VOC emissions, including all assumptions made.

The VOC emissions from the BF casthouse were calculated using the emission factor of 0.011 lb VOC/ton metal, established from testing at Cleveland-Cliffs' Dearborn Works facility in Dearborn, MI. This emission factor was previously established and utilized for completion of the calendar year 2021 Fee Emissions Report (FER).

(18) Capital and operating costs and cost-effectiveness estimates calculated in a manner consistent with the most recent edition of the "United States environmental protection agency air pollution control cost manual."

Refer to calculations in Appendix B. Note that each of the control cost calculations in this report use the Air Pollution Control Cost Estimation Spreadsheets provided by U.S. EPA from their Cost Reports and

Guidance for Air Pollution Regulations website.⁹ As stated in each spreadsheet's directions, "The calculation methodologies used in this spreadsheet are those presented in the U.S. EPA's Air Pollution Control Cost Manual." These spreadsheets provide an estimate sufficient for such a study (i.e., ±30% as stated therein), and are intended for this use as an alternative to the complex engineering analyses that would be necessary to determine the cost for retrofitting emission sources for which applications of these control devices are at least uncommon, if not nonexistent.

4.4.5 Combustion Sources Summary

Pursuant to OAC 3745-21-11(B)(15)(d) which allows affected facilities to recommend operating requirements as RACT for affected sources, Cleveland-Cliffs has summarized the proposed RACT determination for the combustion sources in Table 4-9 below.

Table 4-7 RACT Determination for Combustion Sources

OEPA Emission Unit ID	Company Equipment Description	Proposed RACT Determination
B007	Boiler No.1 (No.2 BH)	Install, maintain and operate the source in accordance with the manufacturer's specifications and with good operating practices for the control of the VOC emissions from the unit.
B008	Boiler No.4 (No.2 BH)	
B009	Boiler No.3 (No.2 BH)	
B010	Boiler No.2 (No.2 BH)	
B021	No. 84 Annealing Furnaces	
B022	Open Coil Annealing Furnaces	
B023	No. 64 Annealing Furnaces	
B026	No. 94 Annealing Furnaces	
P009	No. 3 Slab Reheat Furnace/WHB	
P010	No. 2 Slab Reheat Furnace /WHB	
P011	No. 1 Slab Reheat Furnace /WHB	
P012	No. 4 Slab Reheat Furnace /WHB	
P925	No. 3 Blast Furnace	

4.5 Additional Considerations

U.S. EPA redesignated the Ohio portion of the Cincinnati, Ohio portion of the Ohio-Kentucky area, including Butler County as attainment with the 2015 8-hr NAAQS as noted in a Federal Register notice on June 9, 2022. The Cincinnati area, including Butler County is in attainment with the 2015 8-hr NAAQS effective June 9, 2022, as requested by Ohio EPA December 21, 2021, based on quality assured and certified data for 2019-2021 that show the Cincinnati area attained the 2015 NAAQS.

Subsequent to the years assessed by the VOC RACT program (i.e., 2019-21), Cleveland-Cliffs Middletown has achieved a substantial decrease in VOC and NO_x and emissions by shutting down the Coke Plant on September 30, 2021. The most recent year of full operation of the Coke Plant within the period of the RACT study analysis was 2019, and in that year B918 (Wilputte Underjet 76-oven Coke Battery) and P067 (Gas Holder/Flare) accounted for approximately 394.4 tpy of NO_x emissions and 38.6 tpy of VOC emissions.

⁹ <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>

APPENDIX A: PLOT PLAN

APPENDIX B: COST CALCULATIONS

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2022 dollars)

Incinerator + auxiliary equipment ^a (A) =		
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,443 × Q _{tot} ^{0.5527}) × (2022 CEPI/1999 CEPCI) =	\$2,948,557 in 2022 dollars
Instrumentation ^b =	0.10 × A =	\$294,856
Sales taxes =	0.03 × A =	\$88,457
Freight =	0.05 × A =	\$147,428

Total Purchased equipment costs (B) = \$3,479,297 in 2022 dollars

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
 b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2022 dollars)

Foundations and Supports =	0.08 × B =	\$278,344
Handling and Erection =	0.14 × B =	\$487,102
Electrical =	0.04 × B =	\$139,172
Piping =	0.02 × B =	\$69,586
Insulation for Ductwork =	0.01 × B =	\$34,793
Painting =	0.01 × B =	\$34,793
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
Total Direct Installation Costs =		\$1,043,789
Total Direct Costs (DC) =	B + C + SP + Bldg =	\$4,523,087 in 2022 dollars

Total Indirect Installation Costs (in 2022 dollars)

Engineering =	0.10 × B =	\$347,930
Construction and field expenses =	0.05 × B =	\$173,965
Contractor fees =	0.10 × B =	\$347,930
Start-up =	0.02 × B =	\$69,586
Performance test =	0.01 × B =	\$34,793

Total Indirect Costs (IC) = \$974,203

Contingency Cost (C) =	CF(IC+DC)=	\$549,729
Total Capital Investment =	DC + IC + C =	\$6,047,019 in 2022 dollars

Direct Annual Costs

Catalyst Replacement Cost	$= 1.08 \times CC \times Vol_{cat} \times FWF$ Where CC is the \$/ft ³ cost for the replacement catalyst; Vol _{cat} is the volume of catalyst required based on the waste gas flow rate (Q _w) and the catalyst space velocity (Φ); and FWF is the future worth factor.	\$81,318
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	\$679,154
Annual Fuel Costs for Natural Gas	= Cost _{fuel} × Fuel Usage Rate × 60 min/hr × Operating hours/year	\$4,693,131
Operating Labor	Operator = 1hours/shift × Labor Rate × (Operating hours/8 hours/shift)	\$29,204
Maintenance Costs	Supervisor = 15% of Operator	\$4,381
	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	\$16,907
	Materials = 100% of maintenance labor	\$16,907

Direct Annual Costs (DC) = \$5,521,001 in 2022 dollars

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$40,439
Administrative Charges	= 2% of TCI	\$120,940
Property Taxes	= 1% of TCI	\$60,470
Insurance	= 1% of TCI	\$60,470
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	\$468,098

Indirect Annual Costs (IC) = \$750,417 in 2022 dollars

Total Annual Cost = DC + IC = \$6,271,418 in 2022 dollars

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	\$6,271,418 per year in 2022 dollars
VOC/HAP Pollutants Destroyed =	32.1 tons/year
Cost Effectiveness =	\$195,416 per ton of pollutants removed in 2022 dollars

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2022 dollars)

Incinerator + auxiliary equipment ^a (A) =		
Equipment Costs (EC) for a Fixed Bed Catalytic Oxidizer	= (1,105 × Q _{tot} ^{0.5471}) × (2022 CEPI/1999 CEPCI) =	\$2,118,069 in 2022 dollars
Instrumentation ^b =	0.10 × A =	\$211,807
Sales taxes =	0.03 × A =	\$63,542
Freight =	0.05 × A =	\$105,903

Total Purchased equipment costs (B) = \$2,499,322 in 2022 dollars

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
 b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2022 dollars)

Foundations and Supports =	0.08 × B =	\$199,946
Handling and Erection =	0.14 × B =	\$349,905
Electrical =	0.04 × B =	\$99,973
Piping =	0.02 × B =	\$49,986
Insulation for Ductwork =	0.01 × B =	\$24,993
Painting =	0.01 × B =	\$24,993
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
	Total Direct Installaton Costs =	\$749,797
Total Direct Costs (DC) =	B + C + SP + Bldg =	\$3,249,118 in 2022 dollars

Total Indirect Installation Costs (in 2022 dollars)

Engineering =	0.10 × B =	\$249,932
Construction and field expenses =	0.05 × B =	\$124,966
Contractor fees =	0.10 × B =	\$249,932
Start-up =	0.02 × B =	\$49,986
Performance test =	0.01 × B =	\$24,993
	Total Indirect Costs (IC) =	\$699,810

Contingency Cost (C) =	CF(IC+DC)=	\$394,893
Total Capital Investment =	DC + IC + C =	\$4,343,821 in 2022 dollars

Direct Annual Costs

Catalyst Replacement Cost	$= 1.08 \times CC \times Vol_{cat} \times FWF$ Where CC is the \$/ft ³ cost for the replacement catalyst; Vol _{cat} is the volume of catalyst required based on the waste gas flow rate (Q _g) and the catalyst space velocity (Φ); and FWF is the future worth factor.	\$82,190
Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	\$679,154
Annual Fuel Costs for Natural Gas	= Cost _{fuel} × Fuel Usage Rate × 60 min/hr × Operating hours/year	\$12,667,745
Operating Labor	Operator = 1hours/shift × Labor Rate × (Operating hours/8 hours/shift)	\$29,204
	Supervisor = 15% of Operator	\$4,381
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	\$16,907
	Materials = 100% of maintenance labor	\$16,907

Direct Annual Costs (DC) = \$13,496,487 in 2022 dollars

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$40,439
Administrative Charges	= 2% of TCI	\$86,876
Property Taxes	= 1% of TCI	\$43,438
Insurance	= 1% of TCI	\$43,438
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	\$334,237
Indirect Annual Costs (IC) =		\$548,428 in 2022 dollars

Total Annual Cost = DC + IC = \$14,044,915 in 2022 dollars

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	\$14,044,915 per year in 2022 dollars
VOC/HAP Pollutants Destroyed =	32.1 tons/year
Cost Effectiveness =	\$437,702 per ton of pollutants removed in 2022 dollars

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2022 dollars)

Incinerator + auxiliary equipment ^a (A) =		
Equipment Costs (EC) for Recuperative Thermal Oxidizer	= (21,342 x Qtot(0.25)) x (2022 CEPI/1999 CEPCI) =	\$1,005,785 in 2022 dollars
Instrumentation ^b =	0.10 x A =	\$100,578
Sales taxes =	0.03 x A =	\$30,174
Freight =	0.05 x A =	\$50,289

Total Purchased equipment costs (B) = \$1,186,826 in 2022 dollars

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor
 b - Includes the instrumentation and controls furnished by the incinerator vendor

Direct Installation Costs (in 2022 dollars)

Foundations and Supports =	0.08 x B =	\$94,946
Handling and Erection =	0.14 x B =	\$166,156
Electrical =	0.04 x B =	\$47,473
Piping =	0.02 x B =	\$23,737
Insulation for Ductwork =	0.01 x B =	\$11,868
Painting =	0.01 x B =	\$11,868
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
	Total Direct Installation Costs =	\$356,048
Total Direct Costs (DC) =	B + C + SP + Bldg =	\$1,542,873 in 2022 dollars

Total Indirect Installation Costs (in 2022 dollars)

Engineering =	0.10 x B =	\$118,683
Construction and field expenses =	0.05 x B =	\$59,341
Contractor fees =	0.10 x B =	\$118,683
Start-up =	0.02 x B =	\$23,737
Performance test =	0.01 x B =	\$11,868

Total Indirect Costs (IC) = \$332,311

Contingency Cost (C) =	CF(IC+DC)=	\$187,518
Total Capital Investment =	DC + IC + C =	\$2,062,703 in 2022 dollars

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage x Operating Hours/year x Electricity Price =	\$561,040
Annual Fuel Costs for Natural Gas	= Cost _{fuel} x Fuel Usage Rate x 60 min/hr x Operating hours/year	\$9,408,463
Operating Labor	Operator = 1hours/shift x Labor Rate x (Operating hours/8 hours/shift) Supervisor = 15% of Operator	\$29,204 \$4,381
Maintenance Costs	Labor = 0.5 hours/shift x Labor Rate x (Operating Hours/8 hours/shift) Materials = 100% of maintenance labor	\$16,907 \$16,907

Direct Annual Costs (DC) = \$10,036,901 in 2022 dollars

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$40,439
Administrative Charges	= 2% of TCI	\$41,254
Property Taxes	= 1% of TCI	\$20,627
Insurance	= 1% of TCI	\$20,627
Capital Recovery	= CRF x TCI	\$162,026

Indirect Annual Costs (IC) = \$284,973 in 2022 dollars

Total Annual Cost = DC + IC = \$10,321,874 in 2022 dollars

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =		\$10,321,874 per year in 2022 dollars
VOC/HAP Pollutants Destroyed =		32.1 tons/year
Cost Effectiveness =		\$321,675 per ton of pollutants removed in 2022 dollars

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2022 dollars)

Incinerator + auxiliary equipment ^a (A) =		
Equipment Costs (EC) for Recuperative Thermal Oxidizer	= (10,294 × Q _{tot} × 0.2355) × (2022 CEPI/1999 CEPI) =	\$406,962 in 2022 dollars
Instrumentation ^b =	0.10 × A =	\$40,696
Sales taxes =	0.03 × A =	\$12,209
Freight =	0.05 × A =	\$20,348

Total Purchased equipment costs (B) = \$480,215 in 2022 dollars

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
 b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2022 dollars)

Foundations and Supports =	0.08 × B =	\$38,417
Handling and Erection =	0.14 × B =	\$67,230
Electrical =	0.04 × B =	\$19,209
Piping =	0.02 × B =	\$9,604
Insulation for Ductwork =	0.01 × B =	\$4,802
Painting =	0.01 × B =	\$4,802
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
	Total Direct Installation Costs =	\$144,065
Total Direct Costs (DC) =	B + C + SP + Bldg =	\$624,280 in 2022 dollars

Total Indirect Installation Costs (in 2022 dollars)

Engineering =	0.10 × B =	\$48,022
Construction and field expenses =	0.05 × B =	\$24,011
Contractor fees =	0.10 × B =	\$48,022
Start-up =	0.02 × B =	\$9,604
Performance test =	0.01 × B =	\$4,802

Total Indirect Costs (IC) = \$134,460

Contingency Cost (C) =	CF(IC+DC) =	\$75,874
Total Capital Investment =	DC + IC + C =	\$834,614 in 2022 dollars

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage × Operating Hours/year × Electricity Price =	\$561,040
Annual Fuel Costs for Natural Gas	= Cost _{fuel} × Fuel Usage Rate × 60 min/hr × Operating hours/year	\$25,625,375
Operating Labor	Operator = 1 hours/shift × Labor Rate × (Operating hours/8 hours/shift) Supervisor = 15% of Operator	\$29,204 \$4,381
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift) Materials = 100% of maintenance labor	\$16,907 \$16,907

Direct Annual Costs (DC) = \$26,253,813 in 2022 dollars

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$40,439
Administrative Charges	= 2% of TCI	\$16,692
Property Taxes	= 1% of TCI	\$8,346
Insurance	= 1% of TCI	\$8,346
Capital Recovery	= CRF × TCI	\$65,559

Indirect Annual Costs (IC) = \$139,383 in 2022 dollars

Total Annual Cost = DC + IC = \$26,393,195 in 2022 dollars

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	\$26,393,195 per year in 2022 dollars
VOC/HAP Pollutants Destroyed =	32.1 tons/year
Cost Effectiveness =	\$822,528 per ton of pollutants removed in 2022 dollars

Cost Estimate

Direct Costs

Total Purchased equipment costs (in 2022 dollars)

Incinerator + auxiliary equipment ^a (A) =		
Equipment Costs (EC) for Regenerative Oxidizer	= (2.204 x 100,000 + 11.57 Qtot) x (2022 CEPI/1999 CEPCI) =	\$5,853,942 in 2022 dollars
Instrumentation ^b =	0.10 x A =	\$585,394
Sales taxes =	0.03 x A =	\$175,618
Freight =	0.05 x A =	\$292,697

Total Purchased equipment costs (B) = \$6,907,651 in 2022 dollars

Footnotes

- a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.
 b - Includes the instrumentation and controls furnished by the incinerator vendor.

Direct Installation Costs (in 2022 dollars)

Foundations and Supports =	0.08 x B =	\$552,612
Handling and Erection =	0.14 x B =	\$967,071
Electrical =	0.04 x B =	\$276,306
Piping =	0.02 x B =	\$138,153
Insulation for Ductwork =	0.01 x B =	\$69,077
Painting =	0.01 x B =	\$69,077
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
Total Direct Installation Costs =		\$2,072,295
Total Direct Costs (DC) =	B + C + SP + Bldg =	\$8,979,947 in 2022 dollars

Total Indirect Installation Costs (in 2022 dollars)

Engineering =	0.10 x B =	\$690,765
Construction and field expenses =	0.05 x B =	\$345,383
Contractor fees =	0.10 x B =	\$690,765
Start-up =	0.02 x B =	\$138,153
Performance test =	0.01 x B =	\$69,077

Total Indirect Costs (IC) = \$1,934,142

Contingency Cost (C) =	CF(IC+DC)=	\$1,091,409
Total Capital Investment =	DC + IC + C =	\$12,005,498 in 2022 dollars

Direct Annual Costs

Annual Electricity Cost	= Annual Electricity Usage x Operating Hours/year x Electricity Price =	\$561,040
Annual Fuel Costs for Natural Gas	= Cost _{fuel} x Fuel Usage Rate x 60 min/hr x Operating hours/year	\$1,410,283
Operating Labor	Operator = 1hours/shift x Labor Rate x (Operating hours/8 hours/shift) Supervisor = 15% of Operator	\$29,204 \$4,381
Maintenance Costs	Labor = 0.5 hours/shift x Labor Rate x (Operating Hours/8 hours/shift) Materials = 100% of maintenance labor	\$16,907 \$16,907

Direct Annual Costs (DC) = \$2,038,721 in 2022 dollars

Indirect Annual Costs

Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$40,439
Administrative Charges	= 2% of TCI	\$240,110
Property Taxes	= 1% of TCI	\$120,055
Insurance	= 1% of TCI	\$120,055
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	\$943,037

Indirect Annual Costs (IC) = \$1,463,696 in 2022 dollars

Total Annual Cost = DC + IC = \$3,502,417 in 2022 dollars

Cost Effectiveness

Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)

Total Annual Cost (TAC) =	\$3,502,417 per year in 2022 dollars
VOC/HAP Pollutants Destroyed =	32.1 tons/year
Cost Effectiveness =	\$109,151 per ton of pollutants removed in 2022 dollars

APPENDIX C: RBLC TABLES

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group(s)	Control Method Description	Case-by-Case Basis
AL-0130	Boise Cascade Corporation	AL	No. 3 Power Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
AL-0160	Hog Bayou Energy Center	AL	Boiler, Nat Gas	Natural Gas	Volatile Organic Compounds (VOC)	Efficient Combustion	BACT-PSD
AL-0160	Hog Bayou Energy Center	AL	Boiler, Backup Oil	Natural Gas	Volatile Organic Compounds (VOC)	Efficient Combustion	BACT-PSD
AL-0199	Weyerhaeuser Company	AL	Boiler, 300 Mmbtu/H, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0271	Georgia Pacific Breton Llc	AL	No.4 Power Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AR-0094	John W. Turk Jr. Power Plant	AR	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
CA-1049	La Paloma Generating Co. Llc	CA	Boiler: 5 To < 33.5 Mmbtu/Hr	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
CO-0041	American Soda, Llp, Pineance Facility	CO	Boiler No.1, Main Hot Water, (2)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion	BACT-PSD
FL-0087	Champion International Corp	FL	#6 Power Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
*FL-0330	Port Dolphin Energy Llc	FL	Boilers (4 - 278 Mmbtu/Hr Each)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IA-0067	Walter Scott Jr. Energy Center	IA	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IA-0088	Adm Corn Processing - Cedar Rapids	IA	Natural Gas Boiler (292.5 Mmbtu/H)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IA-0096	Verasun Charles City, Llc	IA	Coe Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
IA-0105	Iowa Fertilizer Company	IA	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IA-0106	Cf Industries Nitrogen, Llc - Port Neal Nitrogen Complex	IA	Boilers	Natural Gas	Volatile Organic Compounds (VOC)	Good Operating Practices And Use Of Natural Gas	BACT-PSD
ID-0021	Magnida	ID	Package Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
IL-0060	Archer Daniels Midland Company	IL	Boiler (11), Gas Fired	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IL-0114	Cronus Chemicals, Llc	IL	Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IN-0234	Grain Processing Corporation	IN	Boiler 1	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
IN-0234	Grain Processing Corporation	IN	Boiler 2	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
KY-0111	Phoenix Paper Wickliffe Llc	KY	#1 Power Boiler	Natural Gas	Volatile Organic Compounds (VOC)	I.Use Of Natural Gas Only; ii.Good Combustion Practices; And iii.Follow Manufacturer's Procedures For Start-Up And Shutdown	OTHER CASE-BY-CASE
KY-0111	Phoenix Paper Wickliffe Llc	KY	#2 Power Boiler	Natural Gas	Volatile Organic Compounds (VOC)	I.Use Of Natural Gas Only; ii.Good Combustion Practices; And iii.Follow Manufacturer's Procedures For Start-Up And Shutdown	N/A
LA-0074	Willamette Industries Inc	LA	Boiler, Gas Fired	Natural Gas	Volatile Organic Compounds (VOC)	Design & Operation	BACT-PSD
LA-0105	Imc-Agrico Company - Faustina Plant	LA	Utility Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0140	Gaylord Container Corporation	LA	Boiler No. 10C	Natural Gas	Volatile Organic Compounds (VOC)	Good Equipment Design, Proper Combustion Techniques	BACT-PSD
LA-0248	Direct Reduction Iron Plant	LA	Dri-109 - Dri Unit #1 Package Boiler Flue Stack	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
LA-0248	Direct Reduction Iron Plant	LA	Dri-209 - Dri Unit #2 Package Boiler Flue Stack	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
LA-0254	Ninemile Point Electric Generating Plant	LA	Auxiliary Boiler (Aux-1)	Natural Gas	Volatile Organic Compounds (VOC)	Use Of Pipeline Quality Natural Gas And Good Combustion Practices	BACT-PSD
*LA-0312	St. James Methanol Plant	LA	B1-13 - Boiler 1 (Eq0003)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
*LA-0312	St. James Methanol Plant	LA	B2-13 - Boiler 2 (Eq0004)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
*LA-0312	St. James Methanol Plant	LA	B2-13-Susd - Boiler 2 Startup/Shutdown (Eq0006)	Natural Gas	Volatile Organic Compounds (VOC)	Follow Manufacturer'S Procedures For Start-Up And Shutdown	BACT-PSD
*LA-0312	St. James Methanol Plant	LA	B1-13-Susd - Boiler 1 Startup/Shutdown (Eq0005)	Natural Gas	Volatile Organic Compounds (VOC)	Follow Manufacturer'S Procedures For Start-Up And Shutdown	BACT-PSD
*LA-0315	G2G Plant	LA	Utility Boiler 1	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Controls (Proper Burner Design And Operation Using Natural Gas)	BACT-PSD
*LA-0315	G2G Plant	LA	Utility Boiler 2	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Controls (Proper Burner Design And Operation Using Natural Gas)	BACT-PSD
*LA-0315	G2G Plant	LA	Utility Boiler 3	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Controls (Proper Burner Design And Operation Using Natural Gas)	BACT-PSD
LA-0346	Gulf Coast Methanol Complex	LA	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
LA-0346	Gulf Coast Methanol Complex	LA	Inline Boilers (4)	Natural Gas	Volatile Organic Compounds (VOC)	Catalytic Oxidation	BACT-PSD
LA-0364	Fg La Complex	LA	Boilers	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices And Compliance With The Applicable Provisions Of 40 Cfr 63 Subpart Dddd	BACT-PSD
LA-0364	Fg La Complex	LA	Pr Waste Heat Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices And Oxidation Catalyst	BACT-PSD
MI-0440	Michigan State University	MI	Eustmboiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
MN-0011	Boise Cascade	MN	Boiler, Nat Gas Fired	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Control	BACT-PSD
MN-0011	Boise Cascade	MN	Boiler, Nat Gas Fired	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Control	BACT-PSD
*ND-0033	Grand Forks Fertilizer Plant	ND	Boilers	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
NE-0046	Aventine Renewable Energy - Aurora West Llc	NE	Gas-Fired Boilers	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
NJ-0011	Linden Cogeneration Technology	NJ	(5) Duct-Fired Heat Recovery Steam Boiler (Nat Gas	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
NJ-0054	(Pclp)	NJ	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	N/A	BACT-PSD
NV-0035	Tracy Substation Expansion Project	NV	Boiler, Auxiliary	Natural Gas	Volatile Organic Compounds (VOC)	Best Combustion Practices.	BACT-PSD
NV-0049	Harrah'S Operating Company, Inc.	NV	Boiler - Unit Ha08	Natural Gas	Volatile Organic Compounds (VOC)	Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case
NV-0049	Harrah'S Operating Company, Inc.	NV	Boiler - Unit F101	Natural Gas	Volatile Organic Compounds (VOC)	Flue Gas Recirculation	OTHER CASE-BY-CASE
NV-0049	Harrah'S Operating Company, Inc.	NV	Boiler - Unit Ba01	Natural Gas	Volatile Organic Compounds (VOC)	Flue Gas Recirculation	Other Case-by-Case
NV-0049	Harrah'S Operating Company, Inc.	NV	Boiler - Unit Ba03	Natural Gas	Volatile Organic Compounds (VOC)	Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case
NV-0049	Harrah'S Operating Company, Inc.	NV	Boiler - Unit Cp01	Natural Gas	Volatile Organic Compounds (VOC)	Flue Gas Recirculation And Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group(s)	Control Method Description	Case-by-Case Basis
NV-0049	Harrah's Operating Company, Inc.	NV	Boiler - Unit Cp03	Natural Gas	Volatile Organic Compounds (VOC)	Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case
NV-0049	Harrah's Operating Company, Inc.	NV	Boiler - Unit Cp26	Natural Gas	Volatile Organic Compounds (VOC)	Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case
NV-0049	Harrah's Operating Company, Inc.	NV	Boiler - Unit Ip04	Natural Gas	Volatile Organic Compounds (VOC)	Operating In Accordance With The Manufacturer'S Specification	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boilers - Units Cc001, Cc002, And Cc003 At City Center	Natural Gas	Volatile Organic Compounds (VOC)	Limiting The Fuel To Natural Gas Only And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boilers - Units Cc004, Cc005, And Cc006 At City Center	Natural Gas	Volatile Organic Compounds (VOC)	Limiting The Fuel To Natural Gas Only And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boiler - Unit Mb090 At Mandalay Bay	Natural Gas	Volatile Organic Compounds (VOC)	Flue Gas Recirculation And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boilers - Units Be102 Thru Be105 At Bellagio	Natural Gas	Volatile Organic Compounds (VOC)	Limiting The Fuel To Natural Gas Only And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boiler - Unit Be111 At Bellagio	Natural Gas	Volatile Organic Compounds (VOC)	Limiting The Fuel To Natural Gas Only And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boilers - Units Cc026, Cc027 And Cc028 At City Center	Natural Gas	Volatile Organic Compounds (VOC)	Limiting The Fuel To Natural Gas Only And Good Combustion Practices	Other Case-by-Case
NV-0050	Mgm Mirage	NV	Boilers - Units Ny42, Ny43, And Ny44 At New York - New York	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	Other Case-by-Case
OH-0269	Biomass Energy, Llc-South Point Power	OH	Auxiliary Boiler, Fuel Oil	Fuel Oil #2	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0269	Biomass Energy, Llc-South Point Power	OH	Auxiliary Boiler, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0271	Sunoco Inc.	OH	Boiler (1)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0307	South Point Biomass Generation	OH	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0307	South Point Biomass Generation	OH	Auxiliary Boiler	Fuel Oil #2	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0368	Pallas Nitrogen Llc	OH	Package Boilers (2 Identical, B003 And B004)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Control (I.E., High Temperatures, Sufficient Excess Air, Sufficient Residence Times, And Good Air/Fuel Mixing)	BACT-PSD
OR-0024	Klamath Falls Cogeneration Facility	OR	Auxiliary Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Is Part Of The Basic Design Of The Auxiliary Boiler, But Even The Highest Possible Permitted Emissions Of Voc, 7.1 T/Yr, Are Too Low To Consider In A Bact Analysis.	BACT-PSD
PA-0186	Fpl Energy Marcus Hook, L.P.	PA	Boiler, (4)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
PA-0187	Grays Ferry Cogen Partnership	PA	Auxiliary Boiler, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
PA-0187	Grays Ferry Cogen Partnership	PA	Auxiliary Boiler, Fuel Oil	#2 Fuel Oil	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
PA-0288	Sunbury Generation Lp/Sunbury Ses	PA	Auxiliary Boiler (Repower)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	OTHER CASE-BY-CASE
*PA-0313	First Quality Tissue Lock Haven Pll	PA	Boiler #3	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	LAER
SC-0061	Columbia Energy Llc	SC	Boilers, Natural Gas (2)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Controls, Clean Burning Fuels	BACT-PSD
SC-0061	Columbia Energy Llc	SC	Boilers, Fuel Oil (2)	No. 2 Fuel Oil	Volatile Organic Compounds (VOC)	Good Combustion Practices, Clean Burning Fuel	BACT-PSD
SC-0071	Columbia Energy Center I-26 & Us Hwy 21 South	SC	Boilers, Auxiliary, Natural Gas, (2)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
SC-0091	Columbia Energy Center	SC	Boiler, Fuel Oil	No. 2 Fuel Oil	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
SC-0091	Columbia Energy Center	SC	Boiler, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
SC-0149	Klausner Holding Usa, Inc	SC	Natural Gas Boiler Eu003	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	OTHER CASE-BY-CASE
SC-0149	Klausner Holding Usa, Inc	SC	Natural Gas Boiler Eu004	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	OTHER CASE-BY-CASE
SC-0149	Klausner Holding Usa, Inc	SC	Natural Gas Boiler Eu005	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	OTHER CASE-BY-CASE
SC-0149	Klausner Holding Usa, Inc	SC	Natural Gas Boiler Eu006	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	OTHER CASE-BY-CASE
*TN-0163	Holston Army Ammunition Plant	TN	Four Boilers, Natural Gas & No. 2 Oil-Fired	Natural Gas	Volatile Organic Compounds (VOC)	Oxidation Catalyst & Good Combustion Practices	BACT-PSD
TX-0237	Port Arthur Refinery	TX	Boiler, Supplemental, (2)	Natural Gas	Volatile Organic Compounds (VOC)	Low Nox Burners	LAER
TX-0237	Port Arthur Refinery	TX	Boiler, Supplemental, Steam	Natural Gas	Volatile Organic Compounds (VOC)	Low-Nox Burners	LAER
TX-0293	Gregory Power Facility	TX	(2) Aux Package Boilers, Epn103 & 104	Nat Gas	Volatile Organic Compounds (VOC)	Fired With Pipeline Quality Nat Gas	BACT-PSD
TX-0297	Exxon-Mobil Beaumont Refinery	TX	Boiler 23, 56Stk_023	Nat Gas	Volatile Organic Compounds (VOC)	Firing Nat Gas And Refinery Fuel Gas	Other Case-by-Case
TX-0297	Exxon-Mobil Beaumont Refinery	TX	Boiler 23 Fugitives, 56Fug_023	Nat Gas	Volatile Organic Compounds (VOC)	None Indicated	Other Case-by-Case
TX-0310	The Goodyear Tire & Rubber Beaumont	TX	Boiler, B108	Nat Gas	Volatile Organic Compounds (VOC)	None Indicated	Other Case-by-Case
TX-0323	Hidalgo Energy Facility	TX	Exist Steam Boiler, Phase 1, 2&3, Stk-801	Nat Gas	Volatile Organic Compounds (VOC)	None Indicated	Other Case-by-Case
TX-0373	Odessa Petrochemical Plant	TX	F Boiler Stack, Eyfblrst	Nat Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	Other Case-by-Case
TX-0373	Odessa Petrochemical Plant	TX	C Boiler Stack, Ey003St	Nat Gas	Volatile Organic Compounds (VOC)	None Indicated	Other Case-by-Case
TX-0416	Shell Oil Deer Park	TX	Boiler, Phenol/Acetone Plant	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
TX-0419	Channel Energy Facility	TX	Boiler, Auxiliary, (3)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
TX-0469	Texas Petrochemicals Houston Facility	TX	Auxiliary Steam Boiler (2)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion And Sweet Natural Gas	BACT-PSD
TX-0656	Gas To Gasoline Plant	TX	Boiler	Natural Gas And Fuel Gas	Volatile Organic Compounds (VOC)	Clean Fuel And Good Combustion Practices	BACT-PSD
TX-0704	Utility Plant	TX	(2) Boilers	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
TX-0704	Utility Plant	TX	Boiler	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
TX-0798	Cedar Bayou Plant	TX	Boiler Mss	Natural Gas	Volatile Organic Compounds (VOC)	Flares	LAER
TX-0888	Orange Polyethylene Plant	TX	Boilers	Natural Gas, Ethane, Fuel, Or Vent Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice And Proper Design. Voc Emissions Associated With Vent Streams Routed To The Boiler Firebox Will Be Minimized By Achieving A Dre Of At Least 99%.	BACT-PSD
*TX-0936	Bill Greehey Refinery East Plant	TX	Boiler	Natural Or Refinery Fuel Gas	Volatile Organic Compounds (VOC)	Gaseous Fuel And Good Combustion Practices	BACT-PSD
VA-0255	Va Power - Possum Point	VA	Boiler, Tangentially-Fired, Unit 4	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices.	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group(s)	Control Method Description	Case by Case Basis
NE-0026	Nucor Steel Division	NE	NNI Reheat Furnace	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
NE-0026	Nucor Steel Division	NE	NNII Reheat Furnace	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
SC-0128	Nucor Steel Corporation (Darlington Pla	SC	Reheat Furnace No.2	Natural Gas	Volatile Organic Compounds (VOC)	FUEL SPECIFICATION AND GOOD COMBUSTION PRACTICES	BACT-PSD
TX-0705	Steel Minimill Facility	TX	Rolling Mill Billet Reheat Furnace	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, IAL	AL	Natural Gas-Fired Reheat Furnace (La21) (Multiple Emission Points)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, IAL	AL	Natural Gas-Fired Reheat Furnace (La21) (Multiple Emission Points)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, IAL	AL	Natural Gas-Fired Reheat Furnace (La21) (Multiple Emission Points)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Reheat Furnace/Beam Mill (Beam Mill Monovent)		Volatile Organic Compounds (VOC)	Proper Operation and Maintenance	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Reheat Furnace/Beam Mill (Reheat Furnace)	Natural Gas	Volatile Organic Compounds (VOC)	Good combustion practices	BACT-PSD
NE-0025	Nucor Steel Division	NE	NNI Preheat Furnace		Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
NE-0025	Nucor Steel Division	NE	NNII Reheat Furnace		Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
WI-0094	Charter Steel Division	WI	Billet Reheat Furnace, P10, S10	Natural Gas	Volatile Organic Compounds (VOC)	THE PERMITTEE MAY NOT USE MORE THAN 54.2 MILLION CUBIC FEET OF NATURAL GAS PER MONTH, AS DETERMINED BY AN AVERAGE OVER ANY 12 CONSECUTIVE MONTHS. REGULATORY BASIS - SYNTHETIC MINOR.	Other Case-by-Case
PA-0262	Carpenter Tech Corp	PA	Reheating Furnaces (8)	Natural Gas	Volatile Organic Compounds (VOC)	COMBUSTION CONTROL	Other Case-by-Case
OH-0246	The Timken Company/Faircrest Plant	OH	Reheat Furnace, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
KY-0094	North American Stainless	KY	Reheat Furnace	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group	Control Method Description	Case by Case Basis
JA-0102	Davenport Works	IA	Annealing Furnace	Natural Gas	Volatile Organic Compounds (VOC)	The Company Is Required To Limit The Amount Of Oils & Coolants Used In Earlier Processes And Apply Good Combustion Practices To The Furnace. There Are No Numerical Limits For Voc's.	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	Natural Gas-Fired Batch Annealing Furnace (535)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	4 Continuous Hot Dip Galvanizing Line (Each Line With Same Multiple Emission Points)	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	4 Continuous Hot Dip Galvanizing Line (Each Line With Same Multiple Emission Points)	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	Natural Gas-Fired Passive Annealing Furnace (La41)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	Natural Gas-Fired Batch Annealing Furnaces (La63, La64)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	Natural Gas - Fired Annealing Furnace (La43) (Multiple Emission Points)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0307	Alloys Plant	AL	Annealing Furnace	Natural Gas	Volatile Organic Compounds (VOC)	Gcp	BACT-PSD
TX-0503	Alumax Secondary Aluminum Smelter	TX	Annealing Furnaces (8)	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
PA-0274	Allegheny Ludlum Corporation - Brackenridge Facility	PA	Four (4) Annealing Furnaces (S-208, S-209, S-210, And S-211)	Natural Gas	Volatile Organic Compounds (VOC)	The Permittee Shall Employ Effective Combustion And Operational Control Practices To Minimize Emissions Of Voc.	BACT-PSD
AR-0171	Nucor Steel Arkansas	AR	Sn-219 Galvanizing Line No, 2 Furnace	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
*WV-0034	West Virginia Steel Mill	WV	Galvanizing Furnaces	Pipeline Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
*WV-0034	West Virginia Steel Mill	WV	Box Annealing Furnaces	Pipeline Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
TX-0459	Alcoa San Antonio Works	TX	Annealers 3, 4A, And 4B	--	Volatile Organic Compounds (VOC)	Good Combustion Practices And Good Combustion Unit Design.	BACT-PSD
TX-0459	Alcoa San Antonio Works	TX	Annealers 1 And 2	--	Volatile Organic Compounds (VOC)	Good Combustion Practices And Good Combustion Unit Design.	BACT-PSD
TX-0287	Alcoa Aluminum Sheet, Plate & Foil	TX	Annealers 3, 4A, And 4B	Sweet Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices And Good Combustion Unit Design.	BACT-PSD
TX-0287	Alcoa Aluminum Sheet, Plate & Foil	TX	Annealers 1 And 2	Sweet Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices And Good Combustion Unit Design.	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Galvanizing Line Equipment (Galvanneal Furnace 2)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Galvanizing Line Equipment (Galvanizing Line 2 Furnace)	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Galvanizing Line Equipment (Galvanizing Line/Galvanneal Furnace)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AR-0172	Nucor Steel Arkansas	AR	Sn-209 Annealing Furnaces	--	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
KY-0115	Nucor Steel Gallatin, Llc	KY	Galvanizing Line #2 Annealing Furnaces (15) (Ep 21-15)	--	Volatile Organic Compounds (VOC)	The Permittee Must Develop A Good Combustion And Operating Practices (Gcop) Plan Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0173	Big River Steel Llc	AR	Batch Annealing Furnaces	--	Volatile Organic Compounds (VOC)	Practice	BACT-PSD
AL-0290	Mount Vernon Mill	AL	Annealing Furnace (S22)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AR-0090	Nucor Steel, Arkansas	AR	Annealing Furnaces Sn-61	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
AR-0090	Nucor Steel, Arkansas	AR	Galvanizing Line, Sn-54	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
AR-0140	Big River Steel Llc	AR	Tunnel Furnaces Sn-20 And 21	Natural Gas	Volatile Organic Compounds (VOC)	Natural Gas And Good Combustion Practice	BACT-PSD
AR-0140	Big River Steel Llc	AR	Boilers Sn-26 And 27, Galvanizing Line	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0140	Big River Steel Llc	AR	Furnaces Sn-39, Annealing	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0140	Big River Steel Llc	AR	Furnace, Annealing Pickling Line	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0140	Big River Steel Llc	AR	Annealing Coating Line Furnace Section	Natural Gas	Volatile Organic Compounds (VOC)	RTO	BACT-PSD
AR-0140	Big River Steel Llc	AR	Furnace, SN-53, Annealing Coating Line Drying	Natural Gas	Volatile Organic Compounds (VOC)	RTO	BACT-PSD
AR-0140	Big River Steel Llc	AR	Furnaces Sn-58 And 60, Final Annealing And Coating Line	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0155	Big River Steel Llc	AR	Furnaces Sn-39, Annealing	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0168	Big River Steel Llc	AR	Annealing And Coating Line Drying Furnace	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas	BACT-PSD
AR-0168	Big River Steel Llc	AR	Galvanizing Line #2 Furnace	Natural Gas	Volatile Organic Compounds (VOC)	Rto	BACT-PSD
AR-0168	Big River Steel Llc	AR	Annealing Furnaces	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0168	Big River Steel Llc	AR	Annealing Pickling Line Furnace Section	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
AR-0168	Big River Steel Llc	AR	Annealing And Coating Line Furnace Section	Natural Gas	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practice	BACT-PSD
IN-0034	Nucor Steel	IN	Furnace, Batch Annealing, 24 Ea	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
IN-0220	Ak Steel Corporation Rockport Works	IN	Hydrogen Batch Annealing Furnaces Nos. 16, 17, And 18	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
KY-0094	North American Stainless	KY	Annealing Furnace, Emission Point 61	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
KY-0094	North American Stainless	KY	Annealing Furnaces, Emission Points, 70 And 71	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0309	Benteler Steel Tube Facility	LA	Annealing Furnace - S10	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
OH-0246	The Timken Company/Faircrest Plant	OH	Annealing Furnace, Natural Gas Fired, (2)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
OH-0246	The Timken Company/Faircrest Plant	OH	Annealing Furnace, Natural Gas	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
OH-0258	Pro Tec Coating Company	OH	Annealing Furnace, Steel	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	N/A
OH-0315	New Steel International, Inc., Haverhill	OH	Annealing Furnace To Pickle Galvanizing Line (2)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
PA-0251	Ellwood National Steel	PA	Ens Annealing	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
PA-0262	Carpenter Tech Corp	PA	Annealing Furnaces (4)	--	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
TN-0140	Norandal Usa	TN	Annealing Ovens (A05-A07)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TN-0140	Norandal Usa	TN	Annealing Ovens (A01 Through A04)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TX-0503	Alumax Secondary Aluminum Smelter	TX	Annealing Furnaces (8)	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TX-0882	Sdsw Steel Mill	TX	Annealing Furnace And Tunnel Furnaces	Natural Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices, Clean Fuel	BACT-PSD
WI-0094	Charter Steel Division	WI	Annealing Furnace, P39, S39	Natural Gas	Volatile Organic Compounds (VOC)	The Permittee May Not Use More Than A Total Of 4.2 Million Cubic Feet Of Natural Gas In The Two Annealing Furnaces Per Month, As Determined By An Average Over Any 12 Consecutive Months. Synthetic Minor Limit	Other Case-by-Case

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group	Control Method Description	Case by Case Basis
WI-0094	Charter Steel Division	WI	Annealing Furnace, P40, S40	Natural Gas	Volatile Organic Compounds (VOC)	The Permittee May Not Use More Than A Total Of 4.2 Million Cubic Feet Of Natural Gas In The Two Annealing Furnaces Per Month, As Determined By An Average Over Any 12 Consecutive Months.	Other Case-by-Case
WI-0181	Charter Steel	WI	Annealing Furnaces, (4), S20-S23	Natural Gas	Volatile Organic Compounds (VOC)	Synthetic Minor Limit Bact For Voc Is Determined To Be Use Of Natural Gas To Fuel The Furnace, No Emission Rate Limit	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group	Control Method Description	Case by Case Basis
AL-0276	Mount Vernon Mill	AL	Walking Beam Furnaces	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
KY-0110	Nucor Steel Brandenburg	KY	Ep 03-01 - Walking Beam Reheat Furnace (Including Cold Starts)	Natural Gas	Volatile Organic Compounds (VOC)	This Ep Is Required To Have A Good Combustion And Operating Practices (Gcop) Plan.	BACT-PSD
MI-0404	Gerdau Macsteel, Inc.	MI	Walking Beam Billet Reheat Furnace (Eubillet-Reheat)	Natural Gas	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
PA-0274	Allegheny Ludlum Corporation - Brackenridge PA	PA	Three (3) Walking Beam Reheat Furnaces (S-201, S-202, And S-203)	Natural Gas	Volatile Organic Compounds (VOC)	The Permittee Shall Employ Effective Combustion And Operational Control Practices To Minimize Emissions Of Voc.	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Primary Fuel	Pollutant Group	Control Method Description	Case by Case Basis
LA-0239	Nucor Steel Louisiana	LA	STV-101-Blast Furnace 1 Hot Blast Stoves Common Stack	Blast Furnace Gas	Volatile Organic Compounds (VOC)	Good Combustion Control	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	STV-201-Blast Furnace 2 Hot Blast Stoves Common Stack	Blast Furnace Gas	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-104 - Blast Furnace 1 Slag Pit 1	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-105 - Blast Furnace 1 Slag Pit 2	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-106 - Blast Furnace 1 Slag Pit 3	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-204 - Blast Furnace 2 Slag Pit 1	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-205 - Blast Furnace 2 Slag Pit 2	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
LA-0239	Nucor Steel Louisiana	LA	SLG-206 - Blast Furnace 2 Slag Pit 3	--	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Pollutant Group	Control Method Description	Case by Case Basis
OH-0292	Wheeling Pittsburgh Steel Corporation	OH	Basic Oxygen Furnaces (2 Vessels), Fugitive Emissions	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0292	Wheeling Pittsburgh Steel Corporation	OH	Basic Oxygen Furnace (2 Vessels) Scrubber	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
OH-0292	Wheeling Pittsburgh Steel Corporation	OH	Ladle Metallurgy Furnace	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
*WV-0034	West Virginia Steel Mill	WV	Horizontal/Vertical Ladle Preheaters	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Ancillary Equipment (Ladle Preheaters/Dryers)	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
AR-0173	Big River Steel Llc	AR	Vertical And Horizontal Ladle Preheaters	Volatile Organic Compounds (VOC)	Combustion Of Natural Gas And Good Combustion Practices	BACT-PSD
IL-0132	Nucor Steel Kankakee, Inc.	IL	Ladle Preheater	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
NE-0025	Nucor Steel Division	NE	Ladle Preheaters (Total)	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
NE-0026	Nucor Steel Division	NE	Ladle Preheater	Volatile Organic Compounds (VOC)	No Controls Feasible	Other Case-by-Case
OH-0381	Northstar Bluescope Steel, Llc	OH	Ladle Preheaters And Dryers (P021-023, P025-026)	Volatile Organic Compounds (VOC)	Use Of Natural Gas, Good Combustion Practices And Design	BACT-PSD
TN-0183	Sinova Silicon Llc	TN	Ladle Preheater #2	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TN-0183	Sinova Silicon Llc	TN	Ladle Preheater #3	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TN-0183	Sinova Silicon Llc	TN	Ladle Preheater #1	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TX-0867	Steel Manufacturing Facility	TX	Melt Shop Ladle Preheaters	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD

RBLC ID	Facility Name	Facility State	Process Name	Pollutant Group	Control Method Description	Case by Case Basis
AL-0307	Alloys Plant	AL	Cold Rolling Mill	Volatile Organic Compounds (VOC)	Fume Control System	BACT-PSD
AL-0307	Alloys Plant	AL	120" Hot Rolling Mill	Volatile Organic Compounds (VOC)	Fume Exhaust Control	BACT-PSD
AL-0307	Alloys Plant	AL	130" Hot Rolling Mill	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AL-0307	Alloys Plant	AL	170" Hot Rolling Mill	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
CT-0150	United Aluminum Corp.	CT	Aluminum Cold Rolling Mills	Volatile Organic Compounds (VOC)	Aluminum Mill Has A Synthetic Fabric Filter. BACT For Voc Was Determined To Be The Use Of A Low Volatility Rolling Lubricant And Control Of Inlet Rollina Lubricant Temperature.	Other Case-by-Case
OH-0369	Nucor Steel Marion, Inc.	OH	Rolling Mill (P009)	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
SC-0042	J. W. Aluminum	SC	Aluminum Rolling Mill	Volatile Organic Compounds (VOC)	Lubricant Substitution: Use Of Normal Paraffin. 98% Saturated Aliphatic.	LAER
TN-0140	Norandal Usa	TN	Rolling Mill	Volatile Organic Compounds (VOC)	Oil Absorption System	BACT-PSD
TX-0503	Alumax Secondary Aluminum Smelter	TX	Rolling Mill (2)	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
TX-0576	Pipe Manufacturing Steel Mini Mill	TX	Rolling Mill Furnaces	Volatile Organic Compounds (VOC)	Good Combustion Practice	BACT-PSD
WI-0098	Charter Steel Division	WI	Hot Rolling Mill	Volatile Organic Compounds (VOC)	Rolling Mill Production Limit (500,000 T/Yr)	LAER
IA-0102	Davenport Works	IA	100" 5 Stand Hot Mill	Volatile Organic Compounds (VOC)	The Company Will Try To Limit The Amount Of Lubricant And Coolant Applied To The Plates. The Add On Control Is A Mist Eliminator.	BACT-PSD
IA-0102	Davenport Works	IA	144" Hot Mill	Volatile Organic Compounds (VOC)	The Company Will Try To Limit The Amount Of Lubricant And Coolant Applied To The Plates. The Add On Control Is A Mist Eliminator.	BACT-PSD
IA-0102	Davenport Works	IA	160" Hot Mill	Volatile Organic Compounds (VOC)	The Company Will Try To Limit The Amount Of Lubricant And Coolant Applied To The Plates. The Add On Control Is A Mist Eliminator.	BACT-PSD
AL-0230	Thyssenkrupp Steel And Stainless Usa, Llc	AL	Hot Strip Mill (Multiple Emission Points)	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AR-0171	Nucor Steel Arkansas	AR	Sn-137 Hot Mill Monovent	Volatile Organic Compounds (VOC)	Good Work Practices	BACT-PSD
AR-0171	Nucor Steel Arkansas	AR	Sn-138 Cold Mill No. 1 Monovent	Volatile Organic Compounds (VOC)	Good Work Practices	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Tunnel Furnaces/Hot Mill (Tunnel Furnace 2)	Volatile Organic Compounds (VOC)	Good Combustion Practices	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Cold Reversing Mills/Cold Mill (Cold Mill Monovent)	Volatile Organic Compounds (VOC)	Proper Operation And Maintenance	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Cold Reversing Mills/Cold Mill (Cold Reversing Mill No. 1)	Volatile Organic Compounds (VOC)	Proper Operation And Maintenance Which Includes Minimized Use Of Oils And/Or Grease.	BACT-PSD
SC-0183	Nucor Steel - Berkeley	SC	Tunnel Furnaces/Hot Mill (Hot Mill Monovent)	Volatile Organic Compounds (VOC)	Proper Operation And Maintenance Of The Hot Mill Monovent.	BACT-PSD
TX-0287	Alcoa Aluminum Sheet, Plate & Foil	TX	Hot Mill Exhaust	Volatile Organic Compounds (VOC)	Hoods Collect Emissions And Route Them To A Purifier, Fan, And Then The Stack.	BACT-PSD
TX-0287	Alcoa Aluminum Sheet, Plate & Foil	TX	Cold Mill Exhaust	Volatile Organic Compounds (VOC)	Hoods Over The Cold Rolling Sections Collect Emissions And Route Them To A Purifier, Fan, Stack Skimmer, And Then The Stack.	BACT-PSD
TX-0459	Alcoa San Antonio Works	TX	Hot Mill Exhaust	Volatile Organic Compounds (VOC)	Hoods Over The Hot Rolling Sections Collect These Emissions And Route Them To A Purifier, Fan And Then The Stack. The Stack Contains A Stack Skimmer That Helps Remove Droplets Of The Coolant From The Exhaust Gas. Coolant Ca	BACT-PSD
TX-0459	Alcoa San Antonio Works	TX	Cold Mill Exhaust	Volatile Organic Compounds (VOC)	In The Cold Mill, Heat Generated By The Rolling Process Is Removed By Spraying The Aluminum Sheet With Circulation Coolant Oil. Some Of The Coolant Oil Becomes Airborne During The Cold Rollina Operation. Hoods Over The Cold	BACT-PSD
IN-0108	Nucor Steel	IN	Hot Strip Mill	Volatile Organic Compounds (VOC)	Natural Gas	BACT-PSD
IN-0108	Nucor Steel	IN	Cold Reversing Mill	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
IN-0196	Nucor Steel	IN	Hot Strip Mill	Volatile Organic Compounds (VOC)	No Controls Feasible	BACT-PSD
AR-0172	Nucor Steel Arkansas	AR	Sn-208 Cold Mill 2 Monovent	Volatile Organic Compounds (VOC)	Good Work Practices	BACT-PSD
TN-0013	Consolidated Aluminum Corp.	TN	Cold Mill	Volatile Organic Compounds (VOC)	Achenbeck Air Pure Sys Or Eqv.	LAER

APPENDIX D: SAFETY DATA SHEETS AND ANALYTICAL DATA

SAFETY DATA SHEET

FERROCOTE™ 722

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 013818-09 B
Product name : FERROCOTE™ 722
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Cleaner. Corrosion inhibitor.
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 4

GHS label elements

Signal word : Warning
Hazard statements : Combustible liquid.

Precautionary statements

Prevention : Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep away from flames and hot surfaces. No smoking.

Section 2. Hazards identification

Response	: Not applicable.
Storage	: Store in a well-ventilated place. Keep cool.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Distillates (petroleum), hydrotreated light	≥25 - ≤50	64742-47-8
Mineral oil	≥25 - ≤50	**
Hydrocarbon waxes (petroleum), oxidized	≤5	64743-00-6
Mineral oil	≤5	-
Sulfonic acids, petroleum, sodium salts	≤1.8	68608-26-4
Sulfonic acids, petroleum, calcium salts, overbased	≤1.6	68783-96-0

**** May contain** : 64742-52-5

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

The exact percentage (concentration) of composition has been withheld as a trade secret

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention if symptoms occur. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do.
Ingestion	: Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.
Eye contact	: Not expected under normal use.
Ingestion	: Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	: Treat symptomatically.
Specific treatments	: No specific treatment.

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Combustible liquid. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

- Hazardous thermal decomposition products** : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides sulfur oxides metal oxide/oxides

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : Eliminate all ignition sources. No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

- Environmental precautions** : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Use non-sparking tools. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dike large spills and use a non-sparking or explosion-proof means to transfer material to an appropriate container for disposal. To reduce potential for static discharge, use proper bonding and grounding procedures. Dispose of via a licensed waste disposal contractor.

Section 6. Accidental release measures

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Storage temperature** : Store between the following temperatures: 4 to 40°C (39.2 to 104°F).
- Shelf life** : 6 months

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Distillates (petroleum), hydrotreated light	ACGIH TLV (United States, 3/2019). Absorbed through skin. TWA: 200 mg/m ³ , (as total hydrocarbon vapor) 8 hours.
Mineral oil	NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Mist STEL: 10 mg/m ³ 15 minutes. Form: Mist ACGIH TLV (United States). TWA: 5 mg/m ³ 8 hours. STEL: 10 mg/m ³ 15 minutes.
Hydrocarbon waxes (petroleum), oxidized Mineral oil	None. NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Mist STEL: 10 mg/m ³ 15 minutes. Form: Mist ACGIH TLV (United States). TWA: 5 mg/m ³ 8 hours.
Sulfonic acids, petroleum, sodium salts	None.
Sulfonic acids, petroleum, calcium salts, overbased	None.

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Section 8. Exposure controls/personal protection

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Translucent. Amber.
- Odor** : Solvent
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : >176°C (>348.8°F)
- Flash point** : Closed cup: 85°C (185°F) [Setaflash.]
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Relative density** : 0.881
- Solubility** : Insoluble in the following materials: cold water.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.

Section 9. Physical and chemical properties

VOC content

Product : 2.75 lbs/gal

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : oxidizing materials

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Not available.

Numerical measures of toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Hydrocarbon waxes (petroleum), oxidized	LD50 Oral	Rat	>5 g/kg	-
Sulfonic acids, petroleum, sodium salts	LD50 Dermal	Rabbit	>500 mg/kg	-
Sulfonic acids, petroleum, calcium salts, overbased	LD50 Oral	Rat	>2000 mg/kg	-
	LD50 Oral	Rat	>5 g/kg	-

Irritation/Corrosion : Based on available data, the classification criteria are not met.

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Based on available data, the classification criteria are not met.

Name	Result
Distillates (petroleum), hydrotreated light Mineral oil	ASPIRATION HAZARD - Category 1 ASPIRATION HAZARD - Category 1

Section 11. Toxicological information

Other information : None identified.

Information on the likely routes of exposure

Inhalation : No known significant effects or critical hazards.
Skin contact : No known significant effects or critical hazards.
Eye contact : No known significant effects or critical hazards.
Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Not expected under normal use.
Skin contact : Not expected under normal use.
Eye contact : Not expected under normal use.
Ingestion : Not expected under normal use.

Section 12. Ecological information

No known significant effects or critical hazards.

Toxicity

Product/ingredient name	Result	Species	Exposure
Distillates (petroleum), hydrotreated light	Acute EC50 1000 mg/l	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1000 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 2200 µg/l Fresh water	Fish - Lepomis macrochirus	4 days
Hydrocarbon waxes (petroleum), oxidized	Acute EC50 >100 mg/l	Algae - Desmodesmus subspicatus	72 hours
	Acute EC50 >100 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 >100 mg/l	Fish - Oncorhynchus mykiss	96 hours
Sulfonic acids, petroleum, sodium salts	Acute EC50 >100 mg/l	Algae - Desmodesmus subspicatus	72 hours
	Acute EC50 >1000 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 >1000 mg/l	Fish - Pimephales promelas	96 hours

Persistence and degradability

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	NA1993	Not regulated.	Not regulated.
UN proper shipping name	Combustible liquid, n.o.s. (Distillates (petroleum), hydrotreated light)	-	-
Transport hazard class(es)	Combustible liquid.	-	-
Packing group	III	-	-
Environmental hazards	No.	No.	No.

Additional information

DOT Classification : Non-bulk packages (less than or equal to 119 gal) of combustible liquids are not regulated as hazardous materials.

Limited quantity Yes.

Packaging instruction Exceptions: 150. Non-bulk: 203. Bulk: 241.

Quantity limitation Passenger aircraft/rail: 60 L. Cargo aircraft: 220 L.

Special provisions 148, IB3, T1, TP1

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

None of the components are listed.

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

Section 15. Regulatory information

CERCLA: Hazardous substances.

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this regulation, Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

Pennsylvania : None of the components are listed.

California

California Prop. 65

This product does not contain any Proposition 65 chemicals.

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 247 g/l ASTM E1868-10 (2021)

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States : All components are active or exempted.

Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision	: 11/2/2021
Version	: 1
Key to abbreviations	Quaker Houghton Product Stewardship : ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) N/A = Not available SGG = Segregation Group UN = United Nations VOC = Volatile Organic Compound
References	: Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .

▣ Indicates information that has changed from previously issued version.

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

SAFETY DATA SHEET

QH EVEROLL™ S 1163 OM

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 020024-10 A
Product name : QH EVEROLL™ S 1163 OM
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Not available.
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :



Signal word : Warning

Section 2. Hazards identification

Hazard statements	: Causes skin irritation. Causes serious eye irritation.
<u>Precautionary statements</u>	
Prevention	: Wear protective gloves. Wear eye or face protection. Wash thoroughly after handling.
Response	: Take off contaminated clothing and wash it before reuse. IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
Storage	: Not applicable.
Disposal	: Not applicable.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Mineral oil	≤10	8012-95-1
Phosphoric acid, isooctyl ester	<3	12645-53-3

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse. Get medical attention if symptoms occur.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do. Get medical attention if symptoms occur.
Ingestion	: Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: pain or irritation, redness
Eye contact	: pain or irritation, redness, watering
Ingestion	: Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically.

Section 4. First aid measures

- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides phosphorus oxides metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

Environmental precautions : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Not available.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Mineral oil	<p>OSHA PEL (United States, 5/2018). [Oil mist, mineral] TWA: 5 mg/m³ 8 hours.</p> <p>ACGIH TLV (United States, 1/2023). [Mineral Oil, pure, highly and severely refined] TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction</p> <p>NIOSH REL (United States, 10/2020). TWA: 5 mg/m³ 10 hours. STEL: 10 mg/m³ 15 minutes.</p>
Phosphoric acid, isooctyl ester	None.

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.

Section 8. Exposure controls/personal protection

- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Dark Amber.
- Odor** : Fatty odor Sulfurous.
- Odor threshold** : Not available.
- pH** : Not applicable.
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Open cup: 177°C (350.6°F)
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Density** : 0.915 g/cm³ [15°C (59°F)]
- Solubility** :

Media	Result
water	Partially soluble

- Partition coefficient: n-octanol/water** : Not applicable.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Kinematic (40°C (104°F)): 22 mm²/s (22 cSt)

VOC content

- Product** : 22.2 g/l ASTM E1868-10 (2021)

Section 9. Physical and chemical properties

0.19 lbs/gal ASTM E1868-10 (2021)

Particle characteristics

Median particle size : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific measures identified.

Incompatible materials : Strong oxidizing materials. strong acids. strong alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Not available.

Numerical measures of toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Mineral oil	LD50 Oral	Rat	>24 g/kg	-

Irritation/Corrosion : Causes severe eye irritation. Causes skin irritation.

Product/ingredient name	Result	Species	Score	Exposure	Observation
Mineral oil	Eyes - Mild irritant	Rabbit	-	1 hours 100 mg	-
	Eyes - Moderate irritant	Rabbit	-	500 mg	-
	Skin - Mild irritant	Guinea pig	-	24 hours 100 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 100 mg	-

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Based on available data, the classification criteria are not met.

Section 11. Toxicological information

Other information : None identified.

Information on the likely routes of exposure

Inhalation : No known significant effects or critical hazards.
Skin contact : Causes skin irritation.
Eye contact : Causes serious eye irritation.
Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Not expected under normal use.
Skin contact : pain or irritation, redness
Eye contact : pain or irritation, redness, watering
Ingestion : Not expected under normal use.

Section 12. Ecological information

This material is toxic to aquatic life. This material is harmful to aquatic life with long lasting effects.

Toxicity

Product/ingredient name	Result	Species	Exposure
Mineral oil	Acute LC50 >100 ppm Fresh water	Fish - <i>Oncorhynchus mykiss</i>	96 hours

Persistence and degradability

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

Ingredient name	CAS number
Sodium dodecylbenzenesulfonate	25155-30-0

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Reportable quantity : ethylene oxide: 10 lbs. (4.54 kg); 1,4-dioxane: 100 lbs. (45.4 kg); sodium dodecylbenzenesulfonate: 1000 lbs. (454 kg);

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Section 15. Regulatory information

State regulations

- Massachusetts** : The following components are listed: OIL MIST, MINERAL
- New York** : None of the components are listed.
- New Jersey** : The following components are listed: MINERAL OIL (HIGHLY REFINED)
- Pennsylvania** : The following components are listed: MINERAL OIL MIST
- California**

California Prop. 65

Ingredient name	Concentration	
1,4-Dioxane	Trace	Cancer
Ethylene oxide	Trace	Cancer, Developmental, Reproductive female, Reproductive male

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 22.2 g/l ASTM E1868-10 (2021)

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

- United States** : All components are active or exempted.
- Canada** : At least one component is not listed in DSL but all such components are listed in NDSL.

Section 16. Other information

Date of issue/Date of revision : 2/12/2024

Version : 1.02

Key to abbreviations

- Quaker Houghton Product Stewardship
- : ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

Section 16. Other information

N/A = Not available
SGG = Segregation Group
UN = United Nations
VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

🔹 **Indicates information that has changed from previously issued version.**

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.



SAFETY DATA SHEET

FERROCOTE™ 61 MAL HCL1

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 011527-11
Product name : FERROCOTE™ 61 MAL HCL1
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Corrosion inhibitor
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
 901 E. Hector Street
 Conshohocken, PA 19428 USA
 T: 610-832-4000

Wallover Oil Company
 21845 Drake Road
 Strongsville, OH 44149 USA
 www.wallover.com
 T: (440) 238-9250

ProductStewardship@quakerhoughton.com
 www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Date of issue/Date of revision : 18 November 2021

Version : 1.01

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Section 2. Hazards identification

Prevention	: Not applicable.
Response	: Not applicable.
Storage	: Not applicable.
Disposal	: Not applicable.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Distillates (petroleum), hydrotreated heavy naphthenic	≥50 - ≤75	64742-52-5
Mineral oil	≤10	-
Mineral oil	≤3	**
Petroleum	≤3	8002-05-9
Sulfonic acids, petroleum, sodium salts	≤3	68608-26-4

** **May contain** : 64742-52-5

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

The exact percentage (concentration) of composition has been withheld as a trade secret

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention if symptoms occur. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do.
Ingestion	: Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.
Eye contact	: Not expected under normal use.
Ingestion	: Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	: Treat symptomatically.
Specific treatments	: No specific treatment.

Date of issue/Date of revision : 18 November 2021

Version : 1.01

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Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst.

- Hazardous thermal decomposition products** : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides sulfur oxides metal oxide/oxides

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

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Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Storage temperature: 4 to 40°C (39.2 to 104°F).
- Shelf life** : 6 months

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Distillates (petroleum), hydrotreated heavy naphthenic	<p>ACGIH TLV (United States, 3/2019). TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction</p> <p>NIOSH REL (United States, 10/2016). TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist</p> <p>OSHA PEL (United States, 5/2018). TWA: 5 mg/m³ 8 hours.</p>
Mineral oil	<p>NIOSH REL (United States, 10/2016). TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist</p> <p>ACGIH TLV (United States). TWA: 5 mg/m³ 8 hours.</p>
Mineral oil	<p>NIOSH REL (United States, 10/2016). TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist</p> <p>ACGIH TLV (United States). TWA: 5 mg/m³ 8 hours. STEL: 10 mg/m³ 15 minutes.</p>
Petroleum	<p>OSHA PEL 1989 (United States, 3/1989). TWA: 400 ppm 8 hours. TWA: 1600 mg/m³ 8 hours.</p> <p>NIOSH REL (United States, 10/2016). TWA: 350 mg/m³ 10 hours. CEIL: 1800 mg/m³ 15 minutes.</p> <p>OSHA PEL (United States, 5/2018). TWA: 500 ppm 8 hours. TWA: 2000 mg/m³ 8 hours.</p>
Sulfonic acids, petroleum, sodium salts	None.

Date of issue/Date of revision : 18 November 2021

Version : 1.01

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Section 8. Exposure controls/personal protection

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Translucent. Green.
- Odor** : Mild.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : 149°C (300.2°F)
- Flash point** : Not available.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : 0.029 kPa (0.22 mm Hg) [room temperature]
- Vapor density** : Not available.
- Relative density** : 0.953

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Section 9. Physical and chemical properties

Solubility : Insoluble in the following materials: cold water.
Solubility in water : Not available.
Partition coefficient: n-octanol/water : Not available.
Auto-ignition temperature : Not available.
Decomposition temperature : Not available.

VOC content

Product : 0.23 lbs/gal ASTM D2369

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific measures identified.

Incompatible materials : Strong oxidizing materials. strong acids. strong alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates
Not available.

Numerical measures of toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Distillates (petroleum), hydrotreated heavy naphthenic	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Petroleum	LD50 Oral	Rat	>5000 mg/kg	-
	LD50 Dermal	Rabbit	>500 mg/kg	-
Sulfonic acids, petroleum, sodium salts	LD50 Dermal	Rabbit	>500 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-

Irritation/Corrosion : Based on available data, the classification criteria are not met.

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Section 11. Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
Distillates (petroleum), hydrotreated heavy naphthenic Petroleum	Skin - Severe irritant	Rabbit	-	500 mg	-
	Eyes - Mild irritant	Rabbit	-	100 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 mg	-

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Product/ingredient name	OSHA	IARC	NTP
Petroleum	-	3	-

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Based on available data, the classification criteria are not met.

Name	Result
Distillates (petroleum), hydrotreated heavy naphthenic	ASPIRATION HAZARD - Category 1

Other information : None identified.

Information on the likely routes of exposure

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Eye contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Not expected under normal use.

Skin contact : Not expected under normal use.

Eye contact : Not expected under normal use.

Ingestion : Not expected under normal use.

Section 12. Ecological information

No known significant effects or critical hazards.

Toxicity

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Section 12. Ecological information

Product/ingredient name	Result	Species	Exposure
Petroleum	Acute LC50 >30 ml/L Marine water	Aquatic plants - Hydrilla verticillata	96 hours
	Acute LC50 0.35 ppm Marine water	Crustaceans - Octopus pallidus - Newly or recently hatched	48 hours
Sulfonic acids, petroleum, sodium salts	Acute LC50 7.46 µg/l Marine water	Fish - Oncorhynchus tshawytscha	96 hours
	Acute EC50 >100 mg/l	Algae - Desmodesmus subspicatus	72 hours
	Acute EC50 >1000 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 >1000 mg/l	Fish - Pimephales promelas	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Additional information

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Section 14. Transport information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

None of the components are listed.

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this regulation, Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

State regulations

Massachusetts : The following components are listed: OIL MIST, MINERAL; PETROLEUM CRUDE

New York : None of the components are listed.

New Jersey : The following components are listed: PETROLEUM DISTILLATES; CRUDE OIL (PETROLEUM)

Pennsylvania : The following components are listed: PETROLEUM

California

California Prop. 65

This product does not contain any Proposition 65 chemicals.

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 36.38 g/l ASTM E1868-10 (2021)

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Section 15. Regulatory information

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States : All components are active or exempted.

Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision : 11/18/2021

Version : 1.01

Quaker Houghton Product Stewardship

Key to abbreviations : ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 N/A = Not available
 SGG = Segregation Group
 UN = United Nations
 VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

▣ Indicates information that has changed from previously issued version.

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

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Corrosion Preventives & Drawing/Forming Laboratory

cc.

Service Request: CTC-20-09

Approval Groupleader/Senior
Chemist

Report to : Linfeng Gou
Reported by : Vincenzo DiSantis
Date of report : 1/27/2020
Account : AK Steel – Middletown, OH
Subject : FERROCOTE 55, Tufflo 55
Reference : Notebook 4445 pgs. 83-84
Objective : Determine VOC content of K6 and FC61 blends

1. Introduction

AK Steel in Middletown, OH blends their own FERROCOTE mill oils by blending FERROCOTE 5684-AS concentrate with various nap oils to achieve desired ratios. They will no longer be using Tufflo 55 due to discontinuation of this material by the supplier, and will be replacing it with FERROCOTE 55 to blend their FERROCOTE “K-6” product. The customer has asked for a VOC comparison of their K-6 blend prepared with the 2 different oil sources be done for their plants VOC permit requirements.

2. Conclusions

The submitted FC 61 Blend sample was found to have VOC levels of 11.08% or 100.84 g/L according to EPA Method 24 and 11.11% or 101.08 g/L according to ASTM E1868-10 SCAQMD Rule 1144. The submitted K6 Tufflo blend with a dilution ratio of 3.27:1 was found to have VOC levels of 23.78% or 213.36 g/L according to EPA Method 24 and 17.84% or 160.02 g/L according to ASTM E1868-10 SCAQMD Rule 1144. The lab prepared K6 blend using FERROCOTE 55 and prepared at a dilution ratio of 3.27:1 was found to have lower VOCs than the submitted K6 Tufflo sample, with a result of 19.08% or 171.94 g/L according to EPA Method 24 and 15.12% or 136.20 g/L according to ASTM E1868-10 SCAQMD Rule 1144. Finally, the lab prepared K6 blend using FERROCOTE 55 and prepared at a dilution ratio of 5:1 was found to have VOC levels of 19.51% or 175.64 g/L according to EPA Method 24 and 15.92% or 143.31 g/L according to ASTM E1868-10 SCAQMD Rule 1144.

3. Materials and Methods

A. Materials

1. FERROCOTE 5684 Concentrate – 1/17/20
2. FC-61 Blend Mix (Calsol 810/FC 5684) – 1/17/20
3. FC K-6 Blend Mix (Tufflo 55/FC 5684) – 1/17/20

18 April , 2024

Coil To Car Group

Vincenzo DiSantis

[https://tciusa.sharepoint.com/sites/aksteel/shared documents/oh middletown/221801.0031 nox voc ract/04 received/2024-0408 final sds_letter- bathe/k6 and fc61 analytical.doc](https://tciusa.sharepoint.com/sites/aksteel/shared%20documents/oh%20middletown/221801.0031%20nox%20vcract/04%20received/2024-0408%20final%20sds_letter_bathe/k6%20and%20fc61_analytical.doc) (3 pages)

4. Lab Prepared K-6 Blends using FERROCOTE 55 oil instead of Tufflo 55

B. Methods

The dilution ratio of the submitted K-6 blend (Tufflo) was determined by conversion of the calcium content (measured using Oxford X-Ray – GTM 6887) to ash and then subsequent dilution ratio using the established method. Once the dilution ratio of the submitted K-6 sample was known, a K-6 lab blend was prepared v:v at the same dilution ratio using the submitted FERROCOTE 5684 concentrate sample and FERROCOTE 55. Because the blend ratio of the submitted K6 sample was not in the normal expected range, a second K6 lab blend was prepared at a 5:1 ratio using FERROCOTE 55.

Once prepared, the VOC level of each sample (4 in total) was determined by EPA Method 24 by weighing ~0.3 ± 0.1 grams of product into an aluminum pan and placing it in a 110°C forced draft oven for 1 hour to remove any volatile components. A second set of VOC measurements were performed following ASTM E1868-10, SCAQMD Rule 1144. This method determines the volatile content of the tested fluids using Thermogravimetric analysis (TGA). 10 µL of sample is added to a clean platinum TGA weigh pan and heated at a rate of 25°C/min until the temperature reached 81°C. The temperature is held constant at 81°C for 110 minutes with a total flow of 50 (20:30) ml/min nitrogen. All of the VOC testing was performed in duplicate and the total volatile content was calculated using **Equations 1 & 2** below and the final reported values are the average of the duplicate runs.

Eq. 1 (For % VOC)

$$m = \frac{(m_i - m_f) * 100\%}{m_i}$$

where...

- m = percent mass loss %
- m_i = initial mass of sample
- m_f = final mass of sample

Eq. 2 (For VOC in g/L)

$$voc = \left(\left(\frac{m_i - m_f}{m_i} \right) - \left(\frac{w}{100} \% \right) \right) * \rho * 1000 \text{ mL/L}$$

where...

- voc = volatile organic compounds content (g/L)
- ρ = density of sample (g/mL)
- w = theoretical water content (0% for this sample)
- m_i = initial mass of sample
- m_f = final mass of sample

4. Results

Table 4.1: Percent Calcium and the Respective Dilution Ratios for Submitted Blend Samples

Sample	Ca %	Dilution Ratio
FC 61 Blend - 1/17/20	0.1658	3.24
K-6 Blend - 1/17/20	0.1645	3.27

Table 4.2: VOC Content of FC61 and K6 Blends by EPA Method 24

Product	Sample Pan	Initial Weight (g)	Final Weight (g)	Density at 15°C	% VOC	VOC in g/L
FC 61 Blend (Submitted)	1	0.3131	0.2724	0.9102 g/mL	13.00	118.32
	2	0.3210	0.2916		9.16	83.36
Average	-	-	-	-	11.08	100.84
K6 Blend with Tufflo 55 (submitted at 3.27:1)	3	0.3070	0.2320	0.8972 g/mL	24.43	219.19
	4	0.3156	0.2426		23.13	207.53
Average	-	-	-	-	23.78	213.36
K6 Blend w/ FC 55 at 3.27:1	5	0.3126	0.2464	0.9011 g/mL	21.18	190.83
	6	0.3038	0.2522		16.98	153.05
Average	-	-	-	-	19.08	171.94
K6 Blend w/ FC 55 at 5:1	7	0.3120	0.2419	0.9002 g/mL	22.47	202.26
	8	0.3135	0.2616		16.56	149.03

Average	-	-	-		19.51	175.64
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Table 4.3: VOC Content of FC61 and K6 Blends by ASTM E1868-10 SCAQMD Rule 1144.

Product	Sample #	Density at 15°C	% VOC	VOC in g/L
FC 61 Blend (Submitted)	1	0.9102 g/mL	10.77	98.03
	2		11.44	104.13
Average	-		11.11	101.08
K6 Blend with Tufflo 55 (submitted at 3.27:1)	1	0.8972 g/mL	17.44	156.47
	2		18.23	163.56
Average	-		17.84	160.02
K6 Blend w/ FC 55 at 3.27:1	1	0.9011 g/mL	15.39	138.68
	2		14.84	133.72
Average	-		15.12	136.20
K6 Blend w/ FC 55 at 5:1	1	0.9002 g/mL	15.99	143.94
	2		15.85	142.68
Average	-		15.92	143.31

SAFETY DATA SHEET

1. Identification

Product identifier	METALUB PL 7105 A
Other means of identification	No data available.
Recommended use:	Corrosion inhibitor
Restrictions on use:	Industrial use only

Manufacturer/Importer/Distributor Information

Manufacturer

Company Name:	Fuchs Lubricants Co.
Address:	17050 Lathrop Avenue Harvey, Illinois 60426
Telephone:	708-333-8900
Fax:	708-333-9180
Contact Person:	EHS Department
E-mail:	sds@fuchs.com

Emergency telephone number: 708-333-8900 (Bus. hrs) 800-255-3924 (24 hrs)

2. Hazard identification

Hazard Classification

Not classified as hazardous under GHS

Label Elements

Hazard Symbol:	No symbol
Signal Word:	No signal word.
Hazard Statement:	Not applicable
Precautionary Statements	Not applicable

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
Mineral oils	Mineral oils,	Trade Secret	60 - 100%
Sulfonated petroleum, sodium salt	Sulfonated petroleum, sodium salt,	Trade Secret	1 - 5%
Butylhydroxytoluene		128-37-0	0.1 - 1%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Trade secret information: A specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Ingestion: Rinse mouth thoroughly. Call a POISON CENTER/doctor if you feel unwell. Do NOT induce vomiting.

Inhalation: Move to fresh air. Call a POISON CENTER/doctor if you feel unwell.

Skin Contact: Remove contaminated clothing and shoes. Wash contact areas with soap and water. If skin irritation occurs: Get medical advice/attention.

Eye contact: Flush thoroughly with water. If irritation occurs, get medical assistance. Continue to rinse for at least 15 minutes.

Most important symptoms/effects, acute and delayed

Symptoms: No data available.

Hazards: No data available.

Indication of immediate medical attention and special treatment needed

Treatment: Get medical attention if symptoms occur.

5. Fire-fighting measures

General Fire Hazards: No unusual fire or explosion hazards noted.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, fog, CO₂, dry chemical, or regular foam. Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: Heat may cause the containers to explode. During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: No data available.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

- Personal precautions, protective equipment and emergency procedures:** See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unauthorized personnel away. Ensure adequate ventilation.
- Methods and material for containment and cleaning up:** Absorb with sand or other inert absorbent. Stop the flow of material, if this is without risk.
- Environmental Precautions:** Avoid release to the environment. Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

- Precautions for safe handling:** Observe good industrial hygiene practices. Wear appropriate personal protective equipment. Do not expose to intense heat as product may expand and pressurize container.
- Conditions for safe storage, including any incompatibilities:** Store in original tightly closed container. Avoid contact with oxidizing agents. Store away from incompatible materials.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values	Source
Mineral oils - Mist.	TWA	1 mg/m ³	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)
Mineral oils - Inhalable fraction.	TWA	5 mg/m ³	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended
Mineral oils - Mist.	TWA	5 mg/m ³	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended
	STEL	10 mg/m ³	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended

Butylhydroxytoluene	TWA	10 mg/m3	Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2), as amended (07 2009)
Butylhydroxytoluene - Vapor and aerosol, inhalable.	TWA	2 mg/m3	Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended) (09 2011)
Butylhydroxytoluene - Inhalable fraction and vapor.	TWA	2 mg/m3	Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents), as amended (11 2010)
Butylhydroxytoluene - Inhalable fraction and vapor.	8 HR ACL	2 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21), as amended (05 2009)
	15 MIN ACL	4 mg/m3	Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21), as amended (05 2009)
Butylhydroxytoluene	TWA	10 mg/m3	Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment), as amended (09 2017)
Butylhydroxytoluene - Inhalable fraction and vapor.	TWA	2 mg/m3	US. ACGIH Threshold Limit Values, as amended (03 2012)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

- General information:** Use personal protective equipment as required.
- Eye/face protection:** Wear safety glasses with side shields (or goggles).
- Skin Protection**
 - Hand Protection:** No data available.
 - Other:** Wear chemical-resistant gloves, footwear, and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.
- Respiratory Protection:** In case of inadequate ventilation use suitable respirator. Seek advice from supervisor on the company's respiratory protection standards.
- Hygiene measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

- Physical state:** liquid
- Form:** No data available.
- Color:** Red
- Odor:** Mild petroleum/solvent
- Odor threshold:** No data available.
- pH:** No data available.
- Melting point/freezing point:** No data available.
- Initial boiling point and boiling range:** No data available.

Flash Point:	160 °C
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	No data available.
Vapor density:	No data available.
Density:	No data available.
Relative density:	0.94
Solubility(ies)	
Solubility in water:	Insoluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	87 mm ² /s (40 °C)
Other information	
VOC:	5.63 % (Method 24) 10 g/l (ASTM E 1868-10)

10. Stability and reactivity

Reactivity:	Not reactive during normal use.
Chemical Stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	None under normal conditions.
Conditions to avoid:	Avoid heat or contamination.
Incompatible Materials:	No data available.
Hazardous Decomposition Products:	Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapors.

11. Toxicological information

Information on likely routes of exposure

Inhalation: Inhalation is the primary route of exposure. In high concentrations, vapors, fumes or mists may irritate nose, throat and mucus membranes.

Skin Contact: Prolonged skin contact may cause redness and irritation.
Eye contact: Eye contact is possible and should be avoided.
Ingestion: May be ingested by accident. Ingestion may cause irritation and malaise.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation: No data available.
Skin Contact: No data available.
Eye contact: No data available.
Ingestion: No data available.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: ATEmix: > 5000 mg/kg

Dermal
Product: ATEmix: > 5000 mg/kg

Inhalation
Product: Not classified for acute toxicity based on available data.

Delayed and immediate effects, including chronic effects from short- and long-term exposure

Product: No data available.

Skin Corrosion/Irritation

Product: No data available.

Serious Eye Damage/Eye Irritation

Product: No data available.

Respiratory or Skin Sensitization

Product: No data available.

Carcinogenicity

Product: No data available.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:

No carcinogenic components identified

ACGIH Carcinogen List:

No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: No data available.

In vivo
Product: No data available.

Reproductive toxicity
Product: No data available.

Specific Target Organ Toxicity - Single Exposure
Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: No data available.

Other effects: No data available.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation

Product: No data available.

BOD/COD Ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration Factor (BCF)

Product: No data available.

Partition Coefficient n-octanol / water (log Kow)

Product: No data available.

Mobility in soil: No data available.

Other adverse effects: No data available.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Dispose of waste at an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal. It is the responsibility of the product user or owner to determine at the time of disposal, which waste regulations must be applied.

Contaminated Packaging: Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

TDG
Not regulated.

IMDG
Not regulated.

IATA
Not regulated.

15. Regulatory information

Canada Federal Regulations
List of Toxic Substances (CEPA, Schedule 1)
Not Regulated

Export Control List (CEPA 1999, Schedule 3)
Not Regulated

National Pollutant Release Inventory (NPRI)
Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements
NPRI PT5 Not Regulated

Canada. National Pollutant Release Inventory (NPRI) Substances, Part 5, VOCs with Additional Reporting Requirements

NPRI PT5 None present or none present in regulated quantities.

Canada. National Pollutant Release Inventory (NPRI) (Schedule 1, Parts 1-4)

NPRI Not Regulated

Greenhouse Gases

Not Regulated

16. Other information, including date of preparation or last revision
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Issue Date: 01/29/2020

Revision Date: 01/29/2020

Version #: 1.1

Further Information: No data available.

Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.



Distribution List: : Nelson Smith, Nancy Ortiz
Reported by : Shafik Dabbas
Department : Steel Rolling – Wet Temper
Date of report : 3/25/2024
Affiliate : USA
Customer : Cleveland Cliffs Middletown
Subject : VOC Analysis Results for TH-Oil 102652-01
Reference : SSR-2024-2560 Isothermal Temperature Relationship to VOC Results, Notebook
5081 Pgs. 41-42.

1. Introduction and Background: This report addresses the analysis of volatile organic compound (VOC) emissions during the wet tempering process, specifically focusing on the influence of temperature variations. Understanding the relationship between temperature and VOC emissions is essential for optimizing operational efficiency and environmental sustainability in industrial processes. The testing is conducted on TH-Oil 102652-01 to evaluate its VOC emissions under different temperature conditions.

2. Objective and Goals: The primary objective of this investigation is to compare VOC emissions at different isothermal temperatures during the wet tempering process. Specifically, the project aims to analyze VOC emissions at temperatures of 38°C (100°F), 54°C (130°F), 71°C (160°F), and the standard temperature of 81°C (178°F) using TH-Oil 10252-01. The tests for each temperature will be conducted isothermally for a duration of two hours.

3. Conclusion: In conclusion, the comparative analysis of VOC emissions at different temperatures during the wet tempering process, using TH-Oil 102652-01, highlights the significant influence of temperature variations on VOC release. Lower temperatures result in reduced VOC emissions, while higher temperatures lead to increased emissions.

4. Materials:

Table 1. Test Material

Test	Method
ASTM	ASTM E 1868-10
TH-Oil (102652-01)	

5. Results/Discussion:

Table 2. Results

Temperature	VOC (gm/L)	VOC (lbs/gal)
38°C (100F)	45.2	0.38
54°C (130F)	136.2	1.14
71°C (160F)	360.8	3.01
81°C (178F) (Standard VOC)	510.3	4.26

The values presented in the table are obtained following the completion of the Thermogravimetric Analysis (TGA) run. During the TGA run, the original weight of the sample and the final residue weight are measured. Additionally, the water content of the sample is determined, along with its density. These parameters are then utilized in the equation below to calculate the concentration of volatile organic compounds (VOC) in grams per liter (gm/L):

$$voc = \left(\left(\frac{m_i - m_f}{m_i} \right) - \left(\frac{w}{100} \% \right) \right) * \rho * 1000 \text{ mL/L}$$

Once the VOC concentration in gm/L is determined, it is converted to pounds per gallon (lbs/gal) using the conversion factor 1 lb = 453.6 gm and the fact that 1 gallon equals approximately 3.785 liters.

$$voc = \left(\left(\frac{voc \left(\frac{gm}{L} \right)}{453.6} \right) \right) * 3.785$$

This conversion allows for the expression of VOC values in a commonly used unit for environmental regulatory purposes.

SAFETY DATA SHEET

QUAKER TH OIL

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 102652-01 A
Product name : QUAKER TH OIL
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Lubricant Oil
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :



Signal word : Danger

Section 2. Hazards identification

Hazard statements	: May be fatal if swallowed and enters airways.
Precautionary statements	
Prevention	: Not applicable.
Response	: IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting.
Storage	: Store locked up.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Ingredient name	%	CAS number
Mineral oil	90 - 100	**

**** May contain** : 64742-46-7, 64742-55-8, 8042-47-5

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

The exact percentage (concentration) of composition has been withheld as a trade secret

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Get medical attention immediately. Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Aspiration hazard if swallowed. Can enter lungs and cause damage.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do.
Ingestion	: Aspiration hazard if swallowed. Can enter lungs and cause damage. Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.
Eye contact	: Not expected under normal use.
Ingestion	: nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	: Treat symptomatically.
Specific treatments	: No specific treatment.

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst.

- Hazardous thermal decomposition products** : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

- Environmental precautions** : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Not available.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Mineral oil	NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Mist STEL: 10 mg/m ³ 15 minutes. Form: Mist ACGIH TLV (United States). TWA: 5 mg/m ³ 8 hours. STEL: 10 mg/m ³ 15 minutes.

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Section 8. Exposure controls/personal protection

- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Yellow.
- Odor** : Mineral oil.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Open cup: 125°C (257°F)
- Evaporation rate** : <0.01 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : >1 [Air = 1]
- Relative density** : 0.85
- Solubility** : Insoluble in the following materials: cold water.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Kinematic (40°C (104°F)): 0.05 cm²/s (5 cSt)

VOC content

- Product** : 477 g/l ASTM E1868-10 (2021)

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : No specific measures identified.

Section 10. Stability and reactivity

Incompatible materials : Strong oxidizing materials. strong acids. strong alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Not available.

Numerical measures of toxicity

Not available.

Irritation/Corrosion : Based on available data, the classification criteria are not met.

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Aspiration hazard if swallowed. Can enter lungs and cause damage.

Name	Result
Mineral oil	ASPIRATION HAZARD - Category 1

Other information : None identified.

Information on the likely routes of exposure

Inhalation : Aspiration hazard if swallowed. Can enter lungs and cause damage.

Skin contact : No known significant effects or critical hazards.

Eye contact : No known significant effects or critical hazards.

Ingestion : Aspiration hazard if swallowed. Can enter lungs and cause damage.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Not expected under normal use.

Skin contact : Not expected under normal use.

Eye contact : Not expected under normal use.

Ingestion : nausea or vomiting

Section 12. Ecological information

No known significant effects or critical hazards.

Toxicity

Not available.

Persistence and degradability

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Additional information

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 14. Transport information

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

None of the components are listed.

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this regulation, Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

Pennsylvania : None of the components are listed.

California

California Prop. 65

This product does not contain any Proposition 65 chemicals.

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 477 g/l ASTM E1868-10 (2021)

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Section 15. Regulatory information

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States : All components are active or exempted.

Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision : 10/24/2021

Version : 1

Quaker Houghton Product Stewardship

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
SGG = Segregation Group
UN = United Nations
VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

▣ Indicates information that has changed from previously issued version.

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

SAFETY DATA SHEET

QUAKER QUAKEROL™ HB-15-AK

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 014484-02 C
Product name : QUAKER QUAKEROL™ HB-15-AK
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Rolling oil
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)


Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : SKIN IRRITATION - Category 2
SERIOUS EYE DAMAGE - Category 1
SKIN SENSITIZATION - Category 1
TOXIC TO REPRODUCTION - Category 2

GHS label elements

Section 2. Hazards identification

Hazard pictograms	:	
Signal word	:	Danger
Hazard statements	:	<p>Causes skin irritation. May cause an allergic skin reaction. Causes serious eye damage. Suspected of damaging fertility or the unborn child.</p>
<u>Precautionary statements</u>		
Prevention	:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves, protective clothing and eye or face protection. Avoid breathing vapor. Wash thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.
Response	:	If exposed or concerned: Get medical advice or attention. Take off contaminated clothing and wash it before reuse. Wash contaminated clothing before reuse. IF ON SKIN: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice or attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor.
Storage	:	Store locked up.
Disposal	:	Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	:	None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Oil, reclaimed	≥50 - ≤75	69029-75-0
Oils, lard, sulfurized	≥25 - ≤50	61790-49-6
Reaction mass of C12-14 tert-alkylamines and dimethyl hydrogen phosphate and methyl dihydrogen phosphate	≤3	-
2-ethylhexanoic acid	≤3	149-57-5
Amines, N-tallow alkyltrimethylenedi-, ethoxylated	≤3	61790-85-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 4. First aid measures

Description of necessary first aid measures

General advice	:	Get medical attention immediately. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	:	Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	:	Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse. Get medical attention if symptoms occur.

Section 4. First aid measures

- Eye contact** : Get medical attention immediately. Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do.
- Ingestion** : Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

- Inhalation** : Not expected under normal use.
- Skin contact** : Pain or irritation, redness, skin rash or hives
- Eye contact** : pain, redness, watering, burns
- Ingestion** : Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

- Hazardous thermal decomposition products** : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

Section 6. Accidental release measures

Environmental precautions : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Storage temperature: 4 to 40°C (39.2 to 104°F).
- Shelf life** : 6 months

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
<input checked="" type="checkbox"/> Oils, reclaimed Oils, lard, sulfurized Reaction mass of C12-14 tert-alkylamines and dimethyl hydrogen phosphate and methyl dihydrogen phosphate 2-ethylhexanoic acid	None. None. None. ACGIH TLV (United States, 1/2021). TWA: 5 mg/m ³ 8 hours. Form: Inhalable fraction and vapor
Amines, N-tallow alkyltrimethylenedi-, ethoxylated	None.

Section 8. Exposure controls/personal protection

Appropriate engineering controls	: Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
Environmental exposure controls	: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
<u>Individual protection measures</u>	
Hygiene measures	: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
Eye/face protection	: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Face shield. If inhalation hazards exist, a full-face respirator may be required instead.
Hand protection	: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.
Other skin protection	: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	: A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
Thermal hazards	: Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

Physical state	: Liquid.
Color	: Clear. Brown.
Odor	: Oily. Sulfurous.
Odor threshold	: Not available.
pH	: Not available.
Melting point	: Not available.
Boiling point	: Not available.
Flash point	: Not available.
Evaporation rate	: Not available.
Flammability (solid, gas)	: Not available.
Lower and upper explosive (flammable) limits	: Not available.

Section 9. Physical and chemical properties

Vapor pressure : Not available.
Vapor density : Not available.
Density : 0.91 g/cm³ [15°C (59°F)]
Solubility : Emulsifies.

Media	Result
Water	Not soluble

Partition coefficient: n-octanol/water : Not applicable.
Auto-ignition temperature : Not available.
Decomposition temperature : Not available.

VOC content

Product : 0.16 lbs/gal EPA Method 24

Particle characteristics

Median particle size : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific measures identified.

Incompatible materials : Strong oxidizing materials. strong acids. strong alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Route	ATE value
Oral	10423.12 mg/kg

Numerical measures of toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Oils, lard, sulfurized 2-ethylhexanoic acid Amines, N-tallow alkyltrimethylenedi-, ethoxylated	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-
	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Dermal	Rat	8410 mg/kg	-
	LD50 Oral	Rat	1600 mg/kg	-
	LD50 Oral	Rat	500 mg/kg	-

Irritation/Corrosion : Causes serious eye damage. Causes skin irritation.

Product/ingredient name	Result	Species	Score	Exposure	Observation
2-ethylhexanoic acid	Eyes - Severe irritant	Rabbit	-	20 mg	-
	Skin - Mild irritant	Rabbit	-	450 mg	-

Sensitization : May cause sensitization by skin contact.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Based on available data, the classification criteria are not met.

Other information : None identified.

Information on the likely routes of exposure

Inhalation : No known significant effects or critical hazards.

Skin contact : Causes skin irritation. May cause sensitization by skin contact.

Eye contact : Causes serious eye damage.

Ingestion : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Not expected under normal use.

Skin contact : Pain or irritation, redness, skin rash or hives

Eye contact : pain, redness, watering, burns

Ingestion : Not expected under normal use.

Section 12. Ecological information

This material is toxic to aquatic life with long lasting effects.

Toxicity

Section 12. Ecological information

Product/ingredient name	Result	Species	Exposure
<input checked="" type="checkbox"/> -ethylhexanoic acid Amines, N-tallow alkyltrimethylenedi-, ethoxylated	Acute EC50 85.4 mg/l Acute LC50 70 mg/l Acute EC50 1 to 10 mg/l	Daphnia - Daphnia magna Fish - Pimephales promelas Daphnia - Daphnia magna	48 hours 96 hours 48 hours

Persistence and degradability

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
<input checked="" type="checkbox"/> -ethylhexanoic acid	2.7	-	low

Mobility in soil





Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	<input checked="" type="checkbox"/> N3082	UN3082
UN proper shipping name	-	<input checked="" type="checkbox"/> ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Reaction mass of C12-14 tert-alkylamines and dimethyl hydrogen phosphate and methyl dihydrogen phosphate, Amines, N-tallow alkyltrimethylenedi-, ethoxylated)	<input checked="" type="checkbox"/> Environmentally hazardous substance, liquid, n.o.s. (Reaction mass of C12-14 tert-alkylamines and dimethyl hydrogen phosphate and methyl dihydrogen phosphate, Amines, N-tallow alkyltrimethylenedi-, ethoxylated)
Transport hazard class(es)	-	<input checked="" type="checkbox"/>  	9  
Packing group	-	<input checked="" type="checkbox"/>	III

Section 14. Transport information

Environmental hazards	No.	<input checked="" type="checkbox"/> Yes.	Yes.
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Additional information

- IMDG** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.
Emergency schedules F-A, S-F
Special provisions 274, 335, 969
- IATA** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.
Quantity limitation Passenger and Cargo Aircraft: 450 L. Packaging instructions: 964. Cargo Aircraft Only: 450 L. Packaging instructions: 964. Limited Quantities - Passenger Aircraft: 30 kg. Packaging instructions: Y964.
Special provisions A97, A158, A197, A215

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

Ingredient name	CAS number
<input checked="" type="checkbox"/> Sodium dodecylbenzenesulfonate	25155-30-0
<input checked="" type="checkbox"/> Phosphoric acid	7664-38-2

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Reportable quantity : Phosphoric acid: 5000 lbs. (2270 kg); sodium dodecylbenzenesulfonate: 1000 lbs. (454 kg);

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Section 15. Regulatory information

State regulations

- Massachusetts** : None of the components are listed.
New York : None of the components are listed.
New Jersey : The following components are listed: 2-ETHYLHEXANOIC ACID
Pennsylvania : None of the components are listed.

California

California Prop. 65

Ingredient name	Concentration	
Trimethyl phosphate	Trace	Cancer

SCAQMD Rule 1144

This product has not been tested for VOC content by the ASTM E-1868-10 (2021) method and is not approved for sale or distribution in the SCAQM District of California if the product is used as a metal forming, metal removal, metal treating, metal protection fluid

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

- United States** : All components are active or exempted.
Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision : 9/6/2022

Version : 2

Quaker Houghton Product Stewardship

Key to abbreviations : ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 N/A = Not available
 SGG = Segregation Group
 UN = United Nations

Section 16. Other information

VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

✔ Indicates information that has changed from previously issued version.

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

SAFETY DATA SHEET

QUAKEROL™ UL MP-16

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 020046-14
Product name : QUAKEROL™ UL MP-16
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Rolling fluid
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.
Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Section 2. Hazards identification

Prevention	: Not applicable.
Response	: Not applicable.
Storage	: Not applicable.
Disposal	: Not applicable.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Mineral oil **	≥10 - ≤25	-
Mineral oil	≤3	8012-95-1

**** May contain** : 64742-52-5

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention if symptoms occur. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do.
Ingestion	: Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.
Eye contact	: Not expected under normal use.
Ingestion	: Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	: Treat symptomatically.
Specific treatments	: No specific treatment.

Section 4. First aid measures

- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst.

- Hazardous thermal decomposition products** : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides phosphorus oxides metal oxide/oxides

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away.

- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Not available.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Mineral oil **	<p>NIOSH REL (United States, 10/2016). TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist</p> <p>ACGIH TLV (United States). TWA: 5 mg/m³ 8 hours. STEL: 10 mg/m³ 15 minutes.</p>
Mineral oil	<p>OSHA PEL (United States, 5/2018). [Oil mist, mineral] TWA: 5 mg/m³ 8 hours.</p> <p>ACGIH TLV (United States, 1/2023). [Mineral Oil, pure, highly and severely refined] TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction</p> <p>NIOSH REL (United States, 10/2020). TWA: 5 mg/m³ 10 hours. STEL: 10 mg/m³ 15 minutes.</p>

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls/personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Amber.
- Odor** : Fatty odor Sulfurous.
- Odor threshold** : Not available.
- pH** : Not applicable.
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Open cup: 193°C (379.4°F)
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Density** : 0.922 g/cm³
- Solubility** :

Media	Result
water	Partially soluble

- Partition coefficient: n-octanol/water** : Not applicable.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.

Section 9. Physical and chemical properties

Viscosity : Dynamic: 205 mPa·s (205 cP)

VOC content

Product : 4.8 g/l
0.12 lbs/gal

Particle characteristics

Median particle size : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific measures identified.

Incompatible materials : Strong oxidizing materials. strong acids. strong alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Not available.

Numerical measures of toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Mineral oil	LD50 Oral	Rat	>24 g/kg	-

Irritation/Corrosion : Based on available data, the classification criteria are not met.

Product/ingredient name	Result	Species	Score	Exposure	Observation
Mineral oil	Eyes - Mild irritant	Rabbit	-	1 hours 100 mg	-
	Eyes - Moderate irritant	Rabbit	-	500 mg	-
	Skin - Mild irritant	Guinea pig	-	24 hours 100 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 100 mg	-

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Section 11. Toxicological information

- Specific target organ toxicity (single exposure)** : Based on available data, the classification criteria are not met.
- Specific target organ toxicity (repeated exposure)** : Based on available data, the classification criteria are not met.
- Aspiration hazard** : Based on available data, the classification criteria are not met.
- Other information** : None identified.

Information on the likely routes of exposure

- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Eye contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

- Inhalation** : Not expected under normal use.
- Skin contact** : Not expected under normal use.
- Eye contact** : Not expected under normal use.
- Ingestion** : Not expected under normal use.

Section 12. Ecological information

No known significant effects or critical hazards.

Toxicity

Product/ingredient name	Result	Species	Exposure
Mineral oil	Acute LC50 >100 ppm Fresh water	Fish - <i>Oncorhynchus mykiss</i>	96 hours

Persistence and degradability

Bioaccumulative potential

Not available.

Mobility in soil

- Soil/water partition coefficient (K_{oc})** : Not available.

- Other adverse effects** : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

Ingredient name	CAS number
Sodium dodecylbenzenesulfonate	25155-30-0

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Reportable quantity : sodium dodecylbenzenesulfonate: 1000 lbs. (454 kg); ethylene oxide: 10 lbs. (4.54 kg); 1,4-dioxane: 100 lbs. (45.4 kg);

SARA 302/304

Section 15. Regulatory information

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

State regulations

Massachusetts : The following components are listed: OIL MIST, MINERAL
New York : None of the components are listed.
New Jersey : The following components are listed: MINERAL OIL (HIGHLY REFINED)
Pennsylvania : The following components are listed: MINERAL OIL MIST
California

California Prop. 65

Ingredient name	Concentration	
1,4-Dioxane	Trace	Cancer
Ethylene oxide	Trace	Cancer, Developmental, Reproductive female, Reproductive male

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 4.8 g/l ASTM E1868-10 (2021)

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States : All components are active or exempted.
Canada : At least one component is not listed in DSL but all such components are listed in NDSL.

Section 16. Other information

Date of issue/Date of revision : 2/12/2024

Version : 1.01

Quaker Houghton Product Stewardship

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
SGG = Segregation Group
UN = United Nations
VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

▣ Indicates information that has changed from previously issued version.

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

SAFETY DATA SHEET

FERROCOTE™ EGL-1-EG

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 013693-14 A
Product name : FERROCOTE™ EGL-1-EG
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Not available.
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com


Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture : SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2A
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (gastrointestinal tract, immune system, liver) - Category 2

GHS label elements

Section 2. Hazards identification

Hazard pictograms	:	
Signal word	:	Warning
Hazard statements	:	Causes skin irritation. Causes serious eye irritation. May cause damage to organs through prolonged or repeated exposure. (gastrointestinal tract, immune system, liver)
<u>Precautionary statements</u>		
Prevention	:	Wear protective gloves. Wear eye or face protection. Do not breathe vapor. Wash thoroughly after handling.
Response	:	Get medical advice or attention if you feel unwell. Take off contaminated clothing and wash it before reuse. IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
Storage	:	Not applicable.
Disposal	:	Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	:	None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Mineral oil **	≥75 - ≤90	-
Mineral oil	≤3	-
Sulfonic acids, petroleum, calcium salts, overbased	≤3	68783-96-0
hexadecylamine	<3	143-27-1

**** May contain** : 64742-52-5, 64742-55-8

Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

Section 4. First aid measures

Description of necessary first aid measures

General advice	:	Get medical attention. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	:	Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	:	Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse. Get medical attention if symptoms occur.
Eye contact	:	Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do. Get medical attention if symptoms occur.

Section 4. First aid measures

Ingestion : Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation : Not expected under normal use.
Skin contact : pain or irritation, redness
Eye contact : pain or irritation, redness, watering
Ingestion : Not expected under normal use.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
Specific treatments : No specific treatment.
Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

Section 6. Accidental release measures

Environmental precautions : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Store between the following temperatures: 4 to 40°C (39.2 to 104°F).
- Shelf life** : 6 months

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Mineral oil **	NIOSH REL (United States, 10/2016). TWA: 5 mg/m ³ 10 hours. Form: Mist STEL: 10 mg/m ³ 15 minutes. Form: Mist ACGIH TLV (United States). STEL: 10 mg/m ³ 15 minutes. TWA: 5 mg/m ³ 8 hours.
Mineral oil	OSHA PEL (United States). TWA: 5 mg/m ³ NIOSH REL (United States). TWA: 5 mg/m ³ NIOSH REL (United States, 10/2020). [OIL MIST MINERAL] TWA: 5 mg/m ³ 10 hours. Form: Mist

Section 8. Exposure controls/personal protection

Sulfonic acids, petroleum, calcium salts, overbased hexadecylamine

STEL: 10 mg/m³ 15 minutes. Form: Mist
ACGIH TLV (United States).
 STEL: 10 mg/m³ 15 minutes.
 TWA: 5 mg/m³ 8 hours.
 None.
 None.

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Amber.
- Odor** : Petroleum oil
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : Not available.

Section 9. Physical and chemical properties

Flash point	: Open cup: 182°C (359.6°F)
Evaporation rate	: Not available.
Flammability (solid, gas)	: Not available.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: Not available.
Vapor density	: Not available.
Density	: 0.888 g/cm ³ [15°C (59°F)]
Solubility	: Not available.
Partition coefficient: n-octanol/water	: Not applicable.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Kinematic (40°C (104°F)): 130 mm ² /s (130 cSt)

VOC content

Product	: 56 g/l	ASTM E1868-10 (2021)
	1.95 lbs/gal	ASTM D2369

Particle characteristics

Median particle size	: Not applicable.
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Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: No specific measures identified.
Incompatible materials	: Strong oxidizing materials. strong acids. strong alkalis
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Based on available data, the classification criteria are not met.

Acute toxicity estimates

Not available.

Numerical measures of toxicity

Section 11. Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
Sulfonic acids, petroleum, calcium salts, overbased	LD50 Oral	Rat	>5 g/kg	-

- Irritation/Corrosion** : Causes severe eye irritation. Causes skin irritation.
- Sensitization** : Based on available data, the classification criteria are not met.
- Mutagenicity** : Based on available data, the classification criteria are not met.
- Carcinogenicity** : Based on available data, the classification criteria are not met.
- Reproductive toxicity** : Based on available data, the classification criteria are not met.
- Specific target organ toxicity (single exposure)** : Based on available data, the classification criteria are not met.
- Specific target organ toxicity (repeated exposure)** : May cause damage to organs through prolonged or repeated exposure.

Name	Category	Route of exposure	Target organs
hexadecylamine	Category 2	-	gastrointestinal tract, immune system, liver

- Aspiration hazard** : Based on available data, the classification criteria are not met.

Name	Result
Mineral oil hexadecylamine	ASPIRATION HAZARD - Category 1 ASPIRATION HAZARD - Category 1

- Other information** : None identified.

Information on the likely routes of exposure

- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Causes skin irritation.
- Eye contact** : Causes serious eye irritation.
- Ingestion** : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

May cause damage to organs through prolonged or repeated exposure.

Symptoms related to the physical, chemical and toxicological characteristics

- Inhalation** : Not expected under normal use.
- Skin contact** : pain or irritation, redness
- Eye contact** : pain or irritation, redness, watering
- Ingestion** : Not expected under normal use.

Section 12. Ecological information

This material is harmful to aquatic life with long lasting effects.

Toxicity

Product/ingredient name	Result	Species	Exposure
hexadecylamine	Acute EC50 0.0036 mg/l Fresh water	Daphnia - <i>Daphnia magna</i>	48 hours

Persistence and degradability

Section 12. Ecological information

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
hexadecylamine	-	-	Inherent

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards	No.	No.	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Clean Water Act (CWA) 311

None of the components are listed.

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Reportable quantity : methanol: 5000 lbs. (2270 kg); 2,2'-iminodiethanol: 100 lbs. (45.4 kg);

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

Pennsylvania : None of the components are listed.

California

California Prop. 65

Ingredient name	Concentration	
Diethanolamine	Trace	Cancer
Methanol	Trace	Developmental

SCAQMD Rule 1144

The sale or distribution in the SCAQM District of California for metal working fluids or direct-contact lubricants is allowed if EITHER the VOC of the product itself OR the VOC of the diluted product at the point of use is less than the following limits: (1) 75 g VOC/L for metal forming, metal removal, metal treating; (2) 50 g VOC/L for metal protection, direct-contact lubricant. The VOC of this product as sold is:

Product as-supplied : 56 g/l ASTM E1868-10 (2021)

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Section 15. Regulatory information

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

United States : All components are active or exempted.

Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision : 4/1/2024

Version : 1

Quaker Houghton Product Stewardship

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- N/A = Not available
- SGG = Segregation Group
- UN = United Nations
- VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

🔍 **Indicates information that has changed from previously issued version.**

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

SAFETY DATA SHEET

TM 98 AKM

SDS according to the U.S. OSHA Hazard Communication Standard (29 CFR 1910.1200), Revision 2012

Section 1. Identification

Product code : 020041-03
Product name : TM 98 AKM
Other means of identification : Not available.

Relevant identified uses of the substance or mixture and uses advised against

Relevant uses : Wet Temper
Uses advised against : Any other purpose.

Supplier : Quaker Houghton PA, Inc.
901 E. Hector Street
Conshohocken, PA 19428 USA
T: 610-832-4000

Wallover Oil Company
21845 Drake Road
Strongsville, OH 44149 USA
www.wallover.com
T: (440) 238-9250

ProductStewardship@quakerhoughton.com
www.quakerhoughton.com

Emergency telephone number (with hours of operation) : CHEMTREC US/Canada:1-800-424-9300 or 1-703-527-3887 (24 hours)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : OXIDIZING LIQUIDS - Category 3
ACUTE TOXICITY (oral) - Category 4
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :



Section 2. Hazards identification

Signal word	: Warning
Hazard statements	: May intensify fire; oxidizer. Harmful if swallowed. Causes serious eye irritation.
<u>Precautionary statements</u>	
Prevention	: Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep away from heat. No smoking. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.
Response	: IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell. Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
Storage	: Not applicable.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Sodium nitrite	≥10 - ≤25	7632-00-0
Alkali neutralized organic acid	<10	-
Alkali neutralized inorganic acid	≤3	-

The exact percentage (concentration) of composition has been withheld as a trade secret

Section 4. First aid measures

Description of necessary first aid measures

General advice	: Get medical attention. If medical advice is needed, have product container or label at hand. Use personal protective equipment as required. Remove contaminated clothing and wash it before reuse. Wash skin surfaces thoroughly after contact.
Inhalation	: Move affected person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention.
Skin contact	: Wash with plenty of soap and water. Remove contaminated clothing and wash it before reuse. Get medical attention if symptoms occur.
Eye contact	: Flush with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do. Get medical attention if symptoms occur.
Ingestion	: Get medical attention. Ingestion may cause gastrointestinal irritation and diarrhea. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.

Section 4. First aid measures

- Eye contact** : Pain or irritation, redness, watering
- Ingestion** : stomach pains, nausea or vomiting, diarrhea

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Use personal protective equipment as required.

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire. Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

Specific hazards arising from the chemical : Oxidizing material. May intensify fire. In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : In a fire, hazardous decomposition products may be produced. carbon oxides (CO, CO₂) nitrogen oxides metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Risk of explosion. If large quantities are involved in a major fire, evacuate the area. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Fight fire from protected location or maximum possible distance.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : Eliminate all ignition sources. No action shall be taken involving any personal risk or without suitable training. Put on appropriate personal protective equipment (see Section 8). Keep unnecessary personnel away. Avoid breathing vapor or mist. Provide adequate ventilation.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". Evacuate area.

Environmental precautions : Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Do not allow any potentially contaminated water, including rain water, runoff from fire fighting or spills, to enter any waterway, sewer or drain.

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

- Small spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Absorb with an inert material and place in an appropriate waste disposal container. Do not absorb in sawdust or other combustible material. Use spark-proof tools and explosion-proof equipment. It may lead to a fire risk when it dries out. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Absorb with an inert material and place in an appropriate waste disposal container. Do not absorb in sawdust or other combustible material. Use spark-proof tools and explosion-proof equipment. It may lead to a fire risk when it dries out. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
- Storage temperature** : Store between the following temperatures: 4 to 40°C (39.2 to 104°F).
- Shelf life** : 6 months

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Sodium nitrite	None.
Alkali neutralized organic acid	None.
Alkali neutralized inorganic acid	None.

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls/personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Keep equipment clean.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.
- Other skin protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : A respirator is not needed under normal and intended conditions of product use. Use appropriate respiratory protection if there is a risk of exceeding any exposure limits.
- Thermal hazards** : Not expected under normal use. Not relevant/applicable due to nature of the product.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Liquid.
- Color** : Clear. Blue.
- Odor** : Mild.
- Odor threshold** : Not available.
- pH** : 9.7 [Conc. (% w/w): 5%]
- Melting point** : Not available.
- Boiling point** : >104°C (>219.2°F)
- Flash point** : Not available.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Relative density** : 1.13
- Solubility** : Insoluble in the following materials: cold water.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.

Section 9. Physical and chemical properties

VOC content

Product : 0.1 lbs/gal

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following:
contact with combustible materials
Reactions may include the following:
risk of causing or intensifying fire

Conditions to avoid : Drying on clothing or other combustible materials may cause fire.

Incompatible materials : combustible materials. reducing materials

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity : Harmful if swallowed.

Acute toxicity estimates

Route	ATE value
Oral	1168.83 mg/kg

Numerical measures of toxicity

Product/ingredient name	Result	Species	Dose	Exposure
sodium nitrite	LD50 Oral	Rat	180 mg/kg	-

Irritation/Corrosion : Causes severe eye irritation.

Product/ingredient name	Result	Species	Score	Exposure	Observation
sodium nitrite	Eyes - Mild irritant	Rabbit	-	24 hours 500 mg	-

Sensitization : Based on available data, the classification criteria are not met.

Mutagenicity : Based on available data, the classification criteria are not met.

Carcinogenicity : Based on available data, the classification criteria are not met.

Reproductive toxicity : Based on available data, the classification criteria are not met.

Specific target organ toxicity (single exposure) : Based on available data, the classification criteria are not met.

Specific target organ toxicity (repeated exposure) : Based on available data, the classification criteria are not met.

Aspiration hazard : Based on available data, the classification criteria are not met.

Other information : None identified.

Section 11. Toxicological information

Information on the likely routes of exposure

Inhalation	: No known significant effects or critical hazards.
Skin contact	: No known significant effects or critical hazards.
Eye contact	: Causes serious eye irritation.
Ingestion	: Harmful if swallowed.

Delayed and immediate effects and also chronic effects from short and long term exposure

None identified.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation	: Not expected under normal use.
Skin contact	: Not expected under normal use.
Eye contact	: Pain or irritation, redness, watering
Ingestion	: stomach pains, nausea or vomiting, diarrhea

Section 12. Ecological information

This material is toxic to aquatic life.

Toxicity

Product/ingredient name	Result	Species	Exposure
sodium nitrite	Acute EC50 159000 µg/l Marine water	Algae - Tetraselmis chuii	72 hours
	Acute EC50 1600000 µg/l Marine water	Algae - Tetraselmis chuii	96 hours
	Acute EC50 15.4 mg/l	Daphnia - Daphnia magna	48 hours
	Acute LC50 1100 µg/l Fresh water	Crustaceans - Cherax quadricarinatus	48 hours
	Acute LC50 0.16 µg/l Fresh water	Fish - Ictalurus punctatus - Fingerling	96 hours
	Chronic NOEC 0.912 mg/l Marine water	Fish - Hippocampus abdominalis - Juvenile (Fledgling, Hatchling, Weanling)	35 days

Persistence and degradability

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
sodium nitrite	-3.7	-	low

Mobility in soil




Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Empty containers or liners may retain some product residues. Empty containers retain product residue and can be hazardous. Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN3099	UN3099	UN3099
UN proper shipping name	Oxidizing liquid, toxic, n.o.s. (sodium nitrite)	OXIDIZING LIQUID, TOXIC, N. O.S. (sodium nitrite)	Oxidizing liquid, toxic, n.o.s. (sodium nitrite)
Transport hazard class(es)	5.1 (6.1) 	5.1 (6.1) 	5.1 (6.1) 
Packing group	III	III	III
Environmental hazards	No.	No.	No.

Additional information

DOT Classification : **Reportable quantity** Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.
Limited quantity Yes.
Packaging instruction Exceptions: 152. Non-bulk: 203. Bulk: 242.
Quantity limitation Passenger aircraft/rail: 2.5 L. Cargo aircraft: 30 L.
Special provisions 62, IB2

IMDG : **Emergency schedules** F-A, S-Q
Special provisions 223, 274

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 2.5 L. Packaging instructions: 551. Cargo Aircraft Only: 30 L. Packaging instructions: 555. Limited Quantities - Passenger Aircraft: 1 L. Packaging instructions: Y541.
Special provisions A3, A803

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations

Toxic Substances Control Act (TSCA)

TSCA 5(a)2 final significant new use rules: sodium nitrite; 4-nonylphenol, branched; Glycine, N-(carboxymethyl)-N-[2-[(carboxymethyl)amino]ethyl]-, sodium salt (1:3)

TSCA 12(b) one-time export: sodium nitrite

Clean Water Act (CWA) 311

Ingredient name	CAS number
sodium nitrite	7632-00-0

Clean Water Act (CWA) 307

None of the components are listed.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

None of the components are listed.

CERCLA: Hazardous substances.

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Reportable quantity : Formaldehyde, solution: 100 lbs. (45.4 kg); sodium hydroxide: 1000 lbs. (454 kg); sodium nitrite: 100 lbs. (45.4 kg); 1,4-dioxane: 100 lbs. (45.4 kg); ethylene oxide: 10 lbs. (4.54 kg);

SARA 302/304

None of the components are listed.

SARA 311/312

Classification : See GHS Classification in section 2 for hazard class information

SARA 313

	Product name	CAS number	De minimus exemptions:
Form R - Reporting requirements	sodium nitrite	7632-00-0	1%

State regulations

Massachusetts : The following components are listed: SODIUM NITRITE

New York : The following components are listed: Sodium nitrite

New Jersey : The following components are listed: SODIUM NITRITE; NITROUS ACID, SODIUM SALT

Pennsylvania : The following components are listed: NITROUS ACID, SODIUM SALT

California

California Prop. 65

Ingredient name	Concentration	
Formaldehyde	Trace	Cancer
1,4-Dioxane	Trace	Cancer
Ethylene oxide	Trace	Cancer, Developmental, Reproductive female, Reproductive male

SCAQMD Rule 1144

Section 15. Regulatory information

This product has not been tested for VOC content by the ASTM E-1868-10 (2021) method and is not approved for sale or distribution in the SCAQM District of California if the product is used as a metal forming, metal removal, metal treating, metal protection fluid

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

- United States** : All components are active or exempted.
Canada : All components are listed or exempted.

Section 16. Other information

Date of issue/Date of revision : 5/5/2022

Version : 2

Quaker Houghton Product Stewardship

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- N/A = Not available
- SGG = Segregation Group
- UN = United Nations
- VOC = Volatile Organic Compound

References : **Safety data sheets of raw materials, global regulatory body information, scientific literature, and testing data .**

🔍 **Indicates information that has changed from previously issued version.**

Notice to reader

This product's safety information is provided to assist our customers in assessing compliance with safety/health/environmental regulations. The information contained herein is based on data available to us and is correct to the best of our knowledge, information and belief at the date of its publication. However, no warranty of merchantability, fitness for any use, or any other warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or the hazards connected with the use of the product. Since the use of this product is within the exclusive control of the user, it is the user's obligation to determine the conditions for safe use of the product. Such conditions should comply with all regulations concerning the product. The company referenced in this Safety Data Sheet assumes no liability for any injury or damage, direct or consequential, resulting from the use of this product unless such injury or damage is attributable to the gross negligence of such company.

Section 16. Other information

APPENDIX E: DEARBORN, MI CASTHOUSE TESTING

**SOURCE TEST REPORT
COMPLIANCE TESTING
C-BLAST FURNACE BAGHOUSE
AK STEEL DEARBORN WORKS
DEARBORN, MICHIGAN**

Prepared for:



AK Steel, Inc.
14660 Rotunda Drive
Dearborn, MI 48120

Prepared by:



Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, Ohio 45240-2788
(800) 229-7495
www.eqm.com

EQM PN: 050074.0221

September 2020

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1. INTRODUCTION

Environmental Quality Management, Inc. (EQM) was retained by AK Steel Dearborn Works to plan and conduct a compliance air sampling program at the C-Blast Furnace Baghouse exhaust. The compliance program was conducted to evaluate emissions of filterable and condensable particulate (PM, PM₁₀, and PM_{2.5}); metals [lead (Pb) and manganese (Mn)]; carbon monoxide (CO); nitrogen oxide (NO_x); volatile organic compounds (VOC); and visible emissions (VEs). Three sampling runs (each run at least 1 cast in duration) were conducted for each method except for visible emissions. One 1-hour run was conducted for visible emissions concurrently with each PM/CPM sampling run. EPA-approved sampling methods and laboratory analysis procedures were used to meet the objectives of the sampling program.

An outline of the test program is presented in Table 1-1. Project participants and responsibilities are presented in Table 1-2.

**Table 1-1. Sampling Requirements for AK Steel
Dearborn, Michigan**

Test Point No.	Test Point Name	Parameter Tested	Test Method
1	C-Blast Furnace Baghouse	Flow Moisture PM/Condensables O ₂ , CO ₂ , CO, NO _x Metals: Pb and Mn VOC Opacity	EPA Method 2 EPA Method 4 EPA Method 5/202 EPA Method 3A, 7E & 10 EPA Method 5/29 EPA Method 25A EPA Method 9

Table 1-2. Project Participants

Name/Company	Responsibility
David Pate/AK Steel Jim Earl/AK Steel	Coordinate process operation and sampling activities Site/Process preparation Process information VE Observations
Mark Dziadosz/EGLE Katherine Koster/EGLE	Agency Review of Process and Sampling Procedures
Doug Allen/EQM Chris Janzen/EQM Ron Kolde/EQM Jeremy Gallagher/EQM Nick Pharo/EQM Eric Zang/EQM	Project Manager Field sampling crew Field sampling crew Field sampling crew Field sampling crew Field sampling crew

2. SUMMARY OF TEST RESULTS

The emission measurement program was performed on August 13, 2020. Table 2-1 presents the average results and limit comparison. Table 2-2 presents a summary of stack gas conditions. Table 2-3 presents total particulate concentrations and mass emission rates. Table 2-4 presents manganese concentrations and mass emission rates. Table 2-5 presents lead concentrations and mass emission rates. Table 2-6 presents nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compound (VOC) concentrations and mass emission rates.

Appendix A summarizes emission and example calculations, Appendix B presents field data, Appendix C presents laboratory results, Appendix D presents calibration data, Appendix E presents process data, Appendix F presents visible emissions data, and Appendix G presents the test protocol, regulatory letter, and correspondence regarding the test effort.

Table 2-1. Average Results and Limit Comparison

Pollutant	C-Blast Furnace Baghouse	Limits^a
PM (lb/hr)	2.07	13.87
PM ₁₀ (lb/hr)	6.39	18.24
PM _{2.5} (lb/hr)	6.39	18.24
Mn (lb/hr)	0.035	0.042
Lead (lb/hr)	0.0009	0.0077
VOC (lb/hr)	2.36	9.92
NO _x (lb/hr)	2.37	5.46
CO (lb/hr)	36.14	56.25
VE	0% ^b	10% ^c

^a Limits as provided in Permit MI-ROP-A8640-2016a.

^b Calculated as highest observed 6-minute average.

^c 6-minute average.

**Table 2-2. Stack Gas Conditions
C-Blast Furnace Baghouse**

August 13, 2020

AK Steel, Dearborn Works

Run No.	Date/Time	Stack Gas Velocity, fps ^a	Volumetric Flow Rate		Stack Temperature, °F	Moisture Content, % H ₂ O	CO ₂ , %	O ₂ , %	
			acfm ^b	dscfm ^c					
Method 5/202 Test Runs (Total Particulate)									
2	8/13/2020 1037-1227	80.3	607,176	514,208	148	1.3	0.2	20.7	
3	8/13/2020 1513-1725	75.7	572,147	489,701	144	1.0	0.2	20.7	
4	8/13/2020 1738-1939	60.7	458,727	386,589	151	1.4	0.4	21.0	
Average		72.2	546,017	463,500	148	1.2	0.2	20.8	
Method 5/29 Test Runs (Metals)									
2	8/13/2020 1037-1227	75.8	572,792	486,735	149	0.8	0.2	20.7	
3	8/13/2020 1513-1725	76.6	578,890	493,348	145	1.2	0.2	20.7	
4	8/13/2020 1738-1939	63.8	482,066	407,091	151	1.2	0.4	21.0	
Average		72.0	544,583	462,392	148	1.1	0.2	20.8	

^aFeet per second.

^bActual cubic feet per minute.

^cDry standard cubic feet per minute.

Note – Averages are for runs 2-4. Run 1 Data and results are presented in Appendix A.

**Table 2-3. Total Particulate Emissions
C-Blast Furnace Baghouse**

August 13, 2020

AK Steel, Dearborn Works

Run No.	Date/Time	Total Particulate Matter		Filterable Particulate Matter		Condensable Particulate Matter	
		Concentration, gr/dscf ^a	Mass Rate, lb/hr ^b	Concentration, gr/dscf ^a	Mass Rate, lb/hr ^b	Concentration, gr/dscf ^a	Mass Rate, lb/hr ^b
2	8/13/2020 1037-1227	1.14E-03	5.01	4.68E-04	2.06	6.68E-04	2.95
3	8/13/2020 1513-1725	1.05E-03	4.40	4.20E-04	1.76	6.29E-04	2.64
4	8/13/2020 1738-1939	2.94E-03	9.75	7.24E-04	2.40	2.22E-03	7.35
Average		1.71E-03	6.39	5.37E-04	2.07	1.17E-03	4.31

^aGrains per dry standard cubic foot.

^bPounds per hour.

Note – Averages are for runs 2-4. Run 1 Data and results are presented in Appendix A.

2-3

**Table 2-4. Front-Half and Back-Half Manganese and Total Manganese Emissions
C-Blast Furnace Baghouse**

August 13, 2020

AK Steel, Dearborn Works

Run No.	Date/Time	Front Half Manganese		Back Half Manganese		Total Manganese	
		Concentration, µg/dscm ^a	Mass Rate, lb/hr ^b	Concentration, µg/dscm ^a	Mass Rate, lb/hr ^b	Concentration, µg/dscm ^a	Mass Rate, lb/hr ^b
2	8/13/2020 1037-1227	19.6	3.56E-02	0.4	7.58E-04	20.0	3.64E-02
3	8/13/2020 1513-1725	27.2	5.01E-02	0.7	1.20E-03	27.8	5.13E-02
4	8/13/2020 1738-1939	10.5	1.59E-02	0.5	8.24E-04	11.0	1.67E-02
Average		19.1	3.39E-02	0.5	9.28E-04	19.6	3.48E-02

^aMicrograms per dry standard cubic meter.

^bPounds per hour.

Note: Averages are for runs 2-4. Run 1 Data and results are presented in Appendix A.

**Table 2-5. Front-Half and Back Half-Lead and Total Lead Emissions
C-Blast Furnace Baghouse**

August 13, 2020

AK Steel, Dearborn Works

Run No.	Date/Time	Front-Half Lead		Back-Half Lead		Total Lead	
		Concentration, $\mu\text{g/dscm}^{\text{a}}$	Mass Rate, lb/hr^{b}	Concentration, $\mu\text{g/dscm}^{\text{a}}$	Mass Rate, lb/hr^{b}	Concentration, $\mu\text{g/dscm}^{\text{a}}$	Mass Rate, lb/hr^{b}
2	8/13/2020 1037-1227	0.4	6.92E-04	0.2	3.53E-04	0.6	1.05E-03
3	8/13/2020 1513-1725	0.3	5.54E-04	0.2	2.83E-04	0.5	8.36E-04
4	8/13/2020 1738-1939	0.4	5.96E-04	0.2	3.04E-04	0.6	9.00E-04
Average		0.4	6.14E-04	0.2	3.14E-04	0.5	9.28E-04

^aMicrograms per dry standard cubic meter.

^bPounds per hour.

Note: Averages are for runs 2-4. Run 1 Data and results are presented in Appendix A. All of the results were below detection limit. Detection limit used in the results.

2-4

**Table 2-6. NO_x, CO, and VOC Emissions
C-Blast Furnace Baghouse**

August 13, 2020

AK Steel, Dearborn Works

Run Date/Time	Nitrogen Oxides			Carbon Monoxide			Volatile Organic Compounds		
	Concentration, ppm^{a}	Mass Rate		Concentration, ppm^{a}	Mass Rate		Concentration, ppm^{a}	Mass Rate	
		lb/hr^{b}	lb/ton^{c}		lb/hr^{b}	lb/ton^{c}		lb/hr^{b}	lb/ton^{c}
8/13/2020 1037-1227	0.9	3.25	1.33E-02	19.1	41.70	0.17	1.0	1.25	5.08E-03
8/13/2020 1513-1725	0.7	2.43	8.98E-03	16.3	35.03	0.13	3.9	4.84	1.79E-02
8/13/2020 1738-1939	0.5	1.41	5.21E-03	18.3	31.68	0.12	1.0	0.99	3.65E-03
Average	0.7	2.37	9.15E-03	17.9	36.14	0.14	2.0	2.36	8.86E-03

^aParts per million, dry basis. VOC ppm is methane corrected.

^bPounds per hour.

^cPounds per ton.

Note: Averages are for runs 2-4. Run 1 Data and results are presented in Appendix A.

3. SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures used in this test program conform to EPA Reference Methods 1 through 4, 5, 7E, 9, 10, 25A, 29, and 202, as published in the Federal Register.

3.1 Location of Measurement Sites

EPA Method 1, "Sample Velocity Traverses for Stationary Sources," was used to select representative measurement sites. The sampling location was at the exhaust of the C-Blast Furnace baghouse. A schematic of the test location is shown in Figure 4-1 in Section 4.

3.2 Stack Gas Volumetric Flow Rate

EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rates," was used to determine stack gas volumetric flow rates. Type "S" pitot tubes meeting EPA specifications and an inclined manometer were used to measure velocity pressures. A calibrated Type "K" thermocouple attached directly to the pitot tube was used to measure stack gas temperature. The stack gas velocity was calculated from the average square root of the stack gas velocity pressure, average stack gas temperature, stack gas molecular weight, and absolute static pressure. The volumetric flow rate is the product of velocity and stack cross-sectional area.

3.3 Stack Gas Dry Molecular Weight

The baghouse sampling location was sampled continuously for CO₂ and O₂ by using non-dispersive infrared analyzers (CO₂) or paramagnetic analyzers (O₂); gaseous pollutants were measured according to EPA Reference Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions From Stationary Sources (Instrumental Analyzer Procedure)." Figure 3-1 is a schematic of the sampling system.

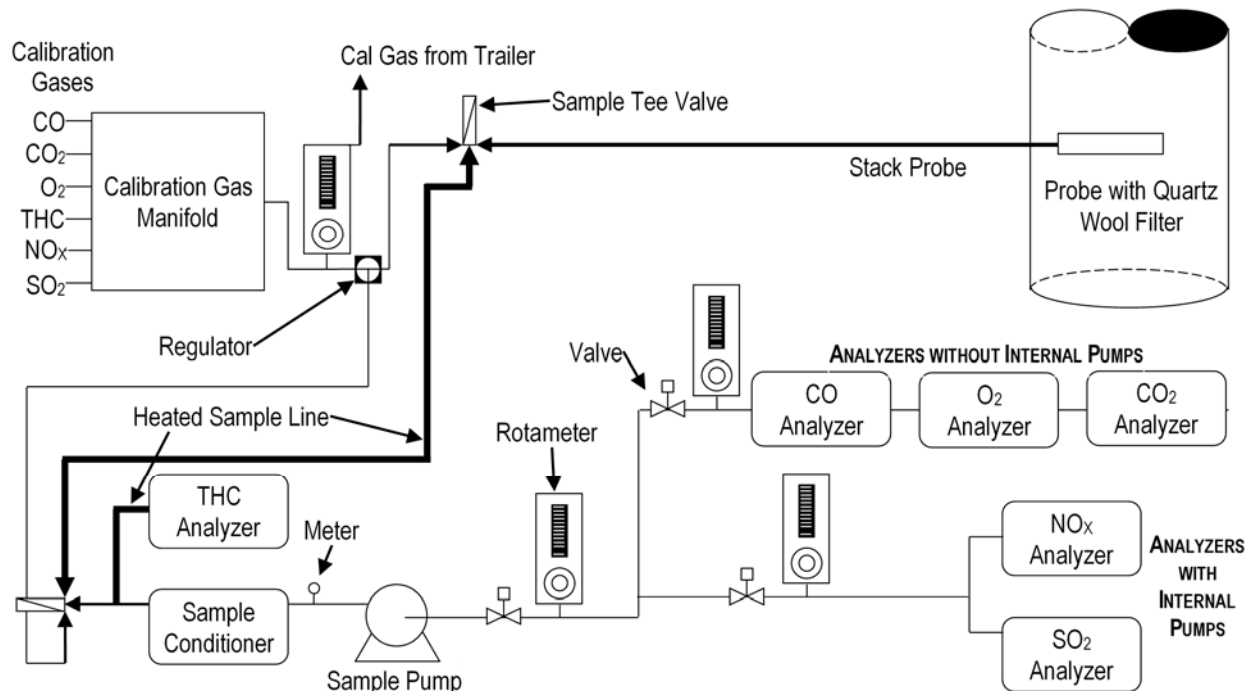


Figure 3-1. CEM Sample Flow and Calibration System

Note: This study used the CO, NO_x, THC, CO₂, and O₂ analyzers.

3.4 Stack Gas Moisture Content

EPA Reference Method 4, “Determination of Moisture Content in Stack Gases,” was used to determine stack gas moisture content. This method was conducted as part of each particulate and metals measurement run. The initial and final contents of all impingers were determined gravimetrically.

3.5 Filterable and Condensable Particulate

EPA Methods 5/202 were used to measure the concentration and mass emission rate of total filterable particulate matter. Particulate matter of less than 10 microns (PM₁₀) and particulate matter of less than 2.5 microns (PM_{2.5}) were determined as the sum of the filterable and condensable fractions. Total suspended particulate (TSP) particulate matter was determined as only the total filterable particulate matter. Four sampling runs and a blank were collected at the baghouse stack outlet location. Figures 3-2 and 3-3 present schematics of the sampling trains for Method 5 and Method 202, respectively.

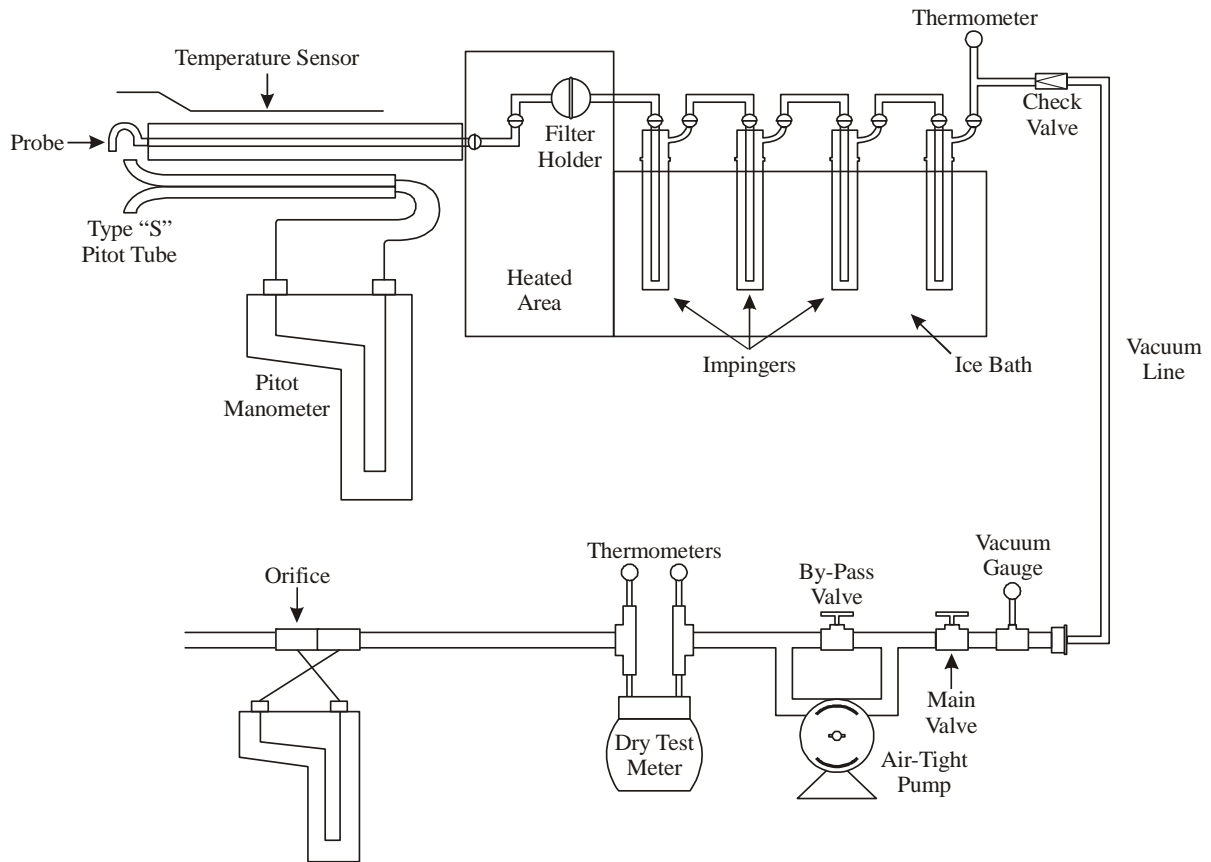


Figure 3-2. Method 5 Front-half of Sampling Train

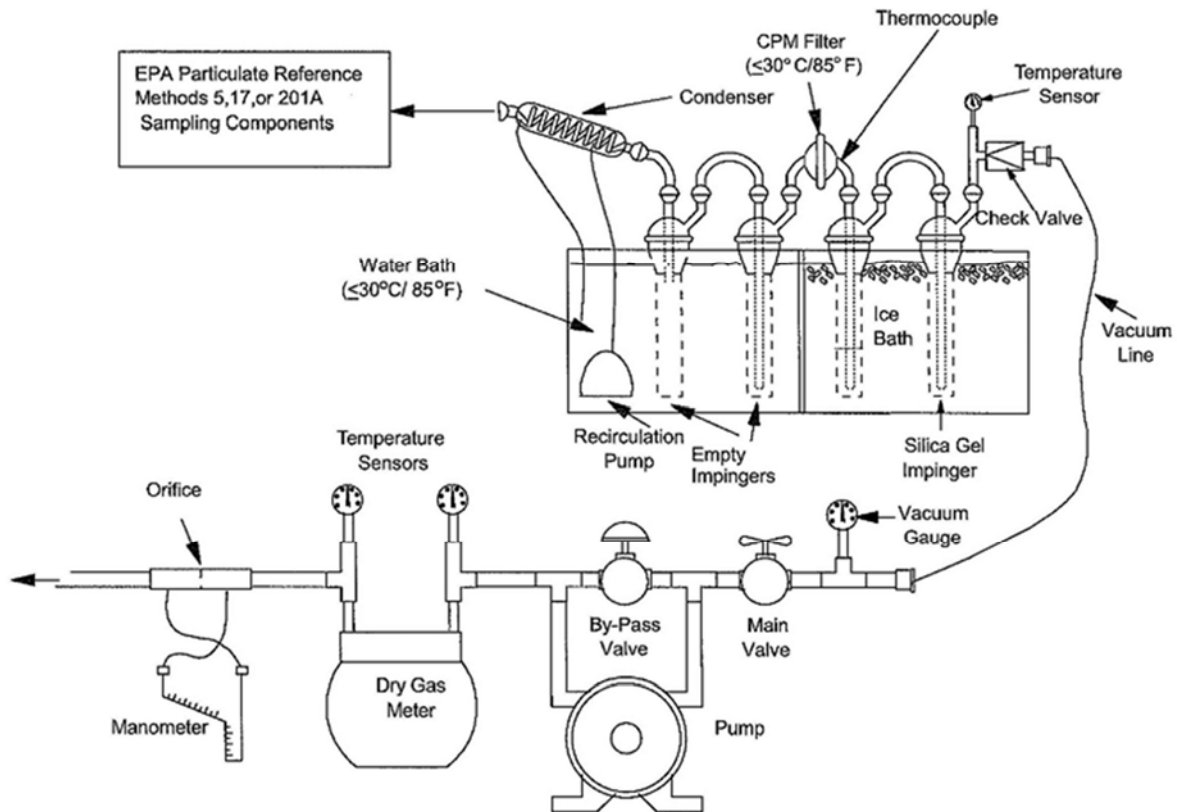


Figure 3-3. Method 202 Sampling Train

3.6 Nitrogen Oxides (NO_x)

Nitrogen oxide concentrations were analyzed following the procedures of EPA Reference Method 7E, “Determination of Nitrogen Oxide Emissions from Stationary Sources by Instrumental Analyzer Technique.” The sampling system consists of a stainless steel probe, a glass fiber filter for particulate matter removal, a heated Teflon sampling line, and a sample gas conditioner to remove moisture prior to the gas entering the chemiluminescent analyzer. A zero gas and two Protocol One calibration gases were used to calibrate the instrument. Data was recorded on a data-logging system recording 1-minute averages of pollutant data. Figure 3-1 is a schematic of the continuous emission analyzer system. An NO₂-NO_x converter efficiency test was conducted according to EPA Method 7E. An NO₂ calibration gas with a value of 49.2 ppm was introduced to the analyzer. The lowest response observed was 48.62 ppm, which is an efficiency of 98.8%. This result is above the 90% converter efficiency that is required. Results are provided in Appendix B.

3.7 Carbon Monoxide (CO)

Carbon monoxide concentrations were sampled and analyzed continuously following the procedures of EPA Method 10, “Determination of Carbon Monoxide Emissions from Stationary Sources by Instrumental Analyzer Technique.” The same sampling system that was used for the other continuous analyzers was used for the CO analyzer. The instrument used is a non-dispersive infrared analyzer manufactured by Thermo Environmental.

A zero gas and two calibration gases were used to calibrate the instrument. Figure 3-1 is a schematic of the sampling system.

3.8 Volatile Organic Compounds (VOC)

EPA Reference Method 25A, “Determination of Total Gaseous Organic Concentration,” was used. The sampling system consisted of a stainless steel probe, a heated Teflon® line, and a heated flame ionization analyzer (FIA). The FIA was calibrated with three Protocol One methane standards in air and a zero gas. Calibrations and drift checks were conducted after each sampling run. After the first run was stopped, the VOC analyzer had a high VOC value and would not calibrate accurately. A second analyzer was calibrated and used with the next three runs. Data was reduced on a dry basis using moisture values from the EPA Reference Method 5 sampling system. A schematic of the sampling system is shown in Figure 3-1. Tedlar bags were collected during each run and were analyzed by Method 18 for methane. VOCs reported in this report are non-methane hydrocarbons.

3.9 Metals

EPA Method 29 was used to determine metals (Pb and Mn) emissions. The test apparatus consisted of a glass nozzle, a heated glass-lined probe, a heated 83-mm quartz fiber filter, four chilled impingers, and a metering console. The samples were withdrawn isokinetically from the source. Particulate emissions were collected in the probe and on the heated filter, and the gaseous emissions were then collected in an aqueous acidic solution of hydrogen peroxide in order to measure lead and manganese emissions. The recovered samples were digested and

analyzed at the laboratory. Three test runs were performed at the baghouse stack outlet. Figure 3-4 is a schematic of the Method 29 sampling train.

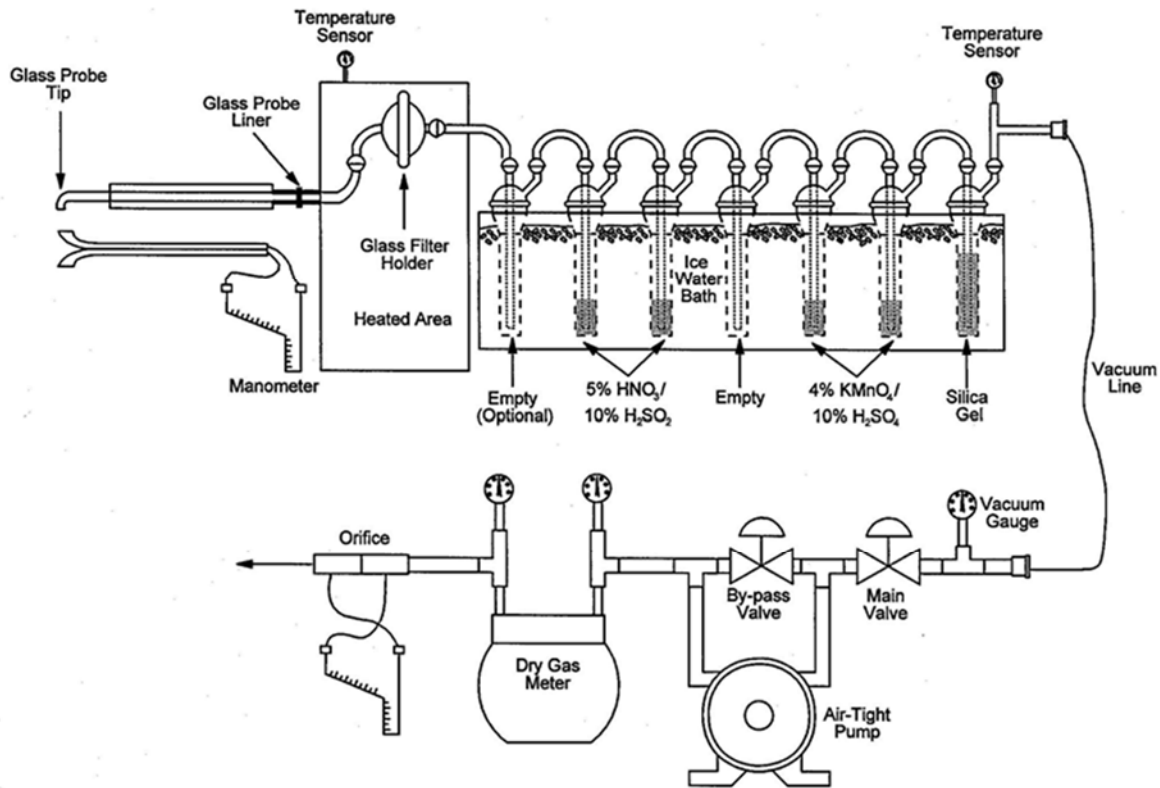


Figure 3-4. Method 5/29 Sampling Train

3.10 Opacity

EPA Method 9, “Visual Determination of the Opacity of Emissions from Stationary Sources,” was used to measure visible emissions from the C-Blast Furnace baghouse exhaust for the test program. During each particulate measurement run, plume opacity was recorded by a certified method 9 observer every 15 seconds (four readings per minute) for 60 minutes. Emissions were calculated as the average of 24 consecutive readings.

3.11 Test Comments

1. A number of issues occurred during the first test run that resulted in the run 1 test results not being included in the test average. These issues were as follows:

- A. A pin of one of the ID Fan louvers failed which caused the fan louver to drift shut. This resulted reduced baghouse inlet pressure that is not representative of normal operations.
- B. A valve feeding a natural gas lance on the casthouse tuyere deck was inadvertently opened allowing uncombusted natural gas to vent to the casthouse collection hoods and thus to the baghouse. This was discovered due to elevated VOC readings that were observed during the first test run and is not indicative of normal operations. Once discovered, the valve was closed.
- C. While the run consisted of a full cast and more than one hour of testing, it was not of sufficient length to complete a full traverse on the stack. After consultation with EGLE personnel, it was agreed that due to the non-representative nature of the run, it could be ended after 1 cast without sampling for another cast so that all test points could be sampled.
- D. After the first run, the VOC analyzer would not pass calibration due to a high VOC background. A second analyzer was used on the subsequent runs without any issues. Because of the failed post-test calibration, the run 1 results for VOC are not valid results and are likely erroneously high.

Because of these reasons, the results reported are the average of runs 2 through 4. The results for run 1 are included in appendix A.

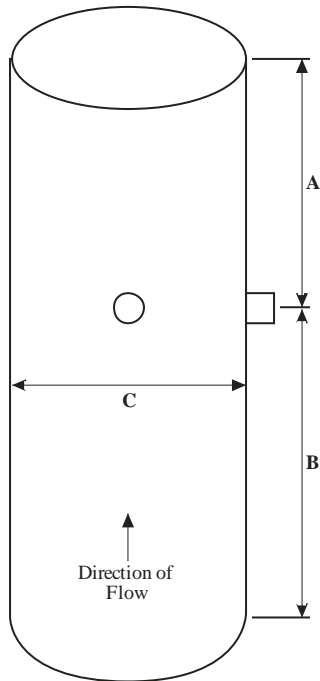
- 2. If EQM had completed a full traverse with the sampling prior to the cast being completed, the traverse was restarted at Point 1. Sampling was continued until the cast was completed. All traverse points sampled were used in the velocity calculations.
- 3. The test plan specified that a non-methane hydrocarbon cutter would be used to determine methane concentration so that non-methane hydrocarbon emissions could be reported. The methane measurement system failed during the first run. Consequently, bag samples were collected and sent to an offsite laboratory for analysis. This was discussed with and approved by EGLE representatives.
- 4. The mass emission calculations for NO_x, CO, and NMVOC used the average flow of the Method 29 and Method 5/202 test runs.
- 5. The analytical report for metals in appendix C only contains the analytical results which is presented within the first 39 pages of the report. The remainder of the analytical report is available on request from AK Steel.
- 6. The audit results were within the acceptable range and are presented in Appendix C.

4. PROCESS DESCRIPTION/SAMPLING LOCATIONS

Molten iron (hot metal) is produced in the blast furnaces by heating iron ore pellets and other iron-bearing materials, coke, limestone, slag, or other fluxing material. Burden materials consisting of iron ore pellets, flux material (slag, limestone, or dolomite), and a carbon source (usually coke) are delivered to and charged into the top of the furnace. Additional carbon is supplied to the furnace by injecting natural gas and pulverized coal into the hot blast section of the furnace. Preheated combustion (hot blast) air is pushed vertically through the burden material in the furnace from tuyeres located at the bottom of the furnace. The components of the burden chemically react with the hot blast air to reduce the iron oxides into elemental iron and melt. The blast furnace produces molten iron, blast furnace gas, and slag.

Periodically, the molten iron and slag are cast from the furnace into a trough and iron runners in the floor of the casthouse. The slag is separated from the molten iron in the trough prior to entering refractory-lined bottle cars. The slag is then diverted to slag pots. The molten iron is transported in bottle cars to the BOF for use in the steelmaking process.

Emissions generated within the casthouse from the molten iron and slag that are cast from the C Blast Furnace are captured by collection hoods and routed to a baghouse that is used to control particulate emissions from the process. Figure 4-1 presents the sampling location. During the testing, production for the C-Blast Furnace averaged 271.2 tons per hour.



Location	Upstream A	Downstream B	Inside Diameter C
C Blast Furnace Baghouse	>37 ft	>148 ft	152 in.
4 Sampling Ports	Three Traverse Points per Port		12 Total Sampling Points
Traverse Pt 1: 20.69 in.	Travers Pt 2: 36.19 in.		Traverse Pt 3: 58.99 in.

Figure 4-1. Sampling Location

5. QUALITY ASSURANCE AND QUALITY CONTROL

The field sampling quality assurance for this project included the use of calibrated source sampling equipment, reference test methods, and traceability protocols for recording and calculating data. The analytical quality assurance includes use of validated analytical procedures, calibration of equipment, and analysis of control samples and blanks. The calibration and quality control procedures used for this test program are described in the following subsection.

5.1 Calibration Procedures and Frequency

All manual stack gas sampling equipment is calibrated before the start of the test program in accordance with the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III*, EPA-600/4-72-027B. Table 5-1 is a summary of the stack gas sampling equipment calibrations that are performed in preparation for this project. The meter boxes are re-calibrated after the test.

Table 5-2 lists additional calibration checks performed on the sampling equipment on site, just prior to the testing, to ensure that equipment was not damaged during transport. Table 5-3 details the field checks conducted on the continuous emission monitoring systems before and during the test program.

Table 5-1. Field Equipment Calibration Summary^a

Equipment	Calibrated Against	Allowable Error
Method 5 meter box	Reference test meter	Y ±0.02 Y ΔH@ ±0.20 ΔH@ post-test Y ±0.05 Y
Pitot tube	Geometric specifications	See EPA Method 2
Thermocouple	ASTM-3F thermometer	±1.5%
Impinger (or condenser thermometer)	ASTM-3F	±2°F
Dry gas meter thermometer	ASTM-3F	±5°F
Probe nozzles	Caliper	±0.004 in.
Barometer	NBS traceable barometer	±0.1 in. Hg

^aAs recommended in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary_Source-Specific Methods*. EPA-600/4-77-027b, August 1977.

Table 5-2. Field Checks of Sampling Equipment

Equipment	Checked Against	Allowable Difference
Pitot tube	Inspection	No visible damage
Thermocouples	ASTM 2F or 3F	±1.5%
Probe nozzles	Caliper	±0.004 in.

Table 5-3. Field Checks of O₂, CO₂, CO, NO_x, and VOC Analyzers

Calibration	Instrument Check	Acceptable Limit
Initial Calibration	O ₂ , CO ₂ , CO, & NO _x Calibration Error, % Span	±2%
	VOC Calibration Error, % Calibration Gas Value	±5%
	Sampling System Bias	±5% of Span
Daily Calibration	O ₂ , CO ₂ , CO, & NO _x Calibration Error, % Span	±2% of Span
	VOC Calibration Error, % Calibration Gas Value	±5% of Cylinder Value
	O ₂ , CO ₂ , CO, VOC, & NO _x Drift, % Span	±3% of Span

APPENDIX A
EXAMPLE CALCULATIONS

NOMENCLATURE AND DIMENSIONS

1-B _{ws}	Dry Mole Fraction	lb/lb•mole	
A	Cross-sectional area of stack, ft ²	N ₂	Nitrogen content, % by volume
acfm	Actual Cubic Feet Per Minute	O ₂	Oxygen content, % by volume
A _n	Cross-sectional area of sampl	P _{bar}	Barometric Pressure, inches Hg
A _s	Cross-sectional area of stack,	P _s	Absolute Stack Pressure, inches Hg
B _{ws}	Moisture, % by volume	P _{static}	Stack Static Pressure, inches H ₂ O
B _{ws(sat)}	Moisture (at saturation), % by volume	PM	Particulate matter collected during the test, mg
CO ₂	Carbon Dioxide content, % by volume	Q	Sample Run Duration, minutes
C _{metals}	Metals concentration, µg/dscm	Q _a	Stack Gas Volumetric flow, acfm
C _p	Pitot Tube Coefficient	Q _m	Average Sampling Rate, dscfm
C _{pm}	Particulate matter concentration, grains/dscf	Q _s	Stack Gas Volumetric flow, dscfm
C _{pmb}	Particulate matter concentration, lb/dscf	Q _{sm}	Stack Gas Volumetric flow, dscmm
dscf	Dry standard cubic feet	T _m	Average Meter Temperature, °F
dscfm	Dry Standard Cubic Feet Per Minute	T _s	Average Stack Temperature, °F
dscmm	Dry standard cubic meter per minute	V _{ic}	Volume of Condensate Collected in Impingers and Silica Gel, ml
DH	Avg Meter Orifice Pressure, in. H ₂ O	V _m	Sample Volume, ft ³
D _n	Nozzle Diameter, inches	V _{m(std)}	Standard Meter Volume, ft ³
Dp ^{1/2}	Average Square Root Dp, (in. H ₂ O) ^{1/2}	V _s	Stack Gas Velocity, ft/s
E _{metals}	Metals mass emission rate, lb/hr	V _{wstd}	Standard Water Vapor Volume, ft ³
E _{pm}	Particulate mass emission rate, lb/hr	y	Meter Box Correction Factor
I	Isokinetic Sampling Ratio, %		
La	Maximum acceptable leakage check rate; equal to 0.020 ft ³ /min or 4% of the average sampling rate, whichever is less		
M _{catch}	Metal sample collected, µg		
M _d	Molecular Weight (d.b.), lb/lb•mole		
M _s	Molecular Weight (w.b.),		

EXAMPLE CALCULATIONS FOR POLLUTANT EMISSIONS

1. **Cross sectional area of sampling nozzle, ft².**

$$A_n = (D_n / 2)^2 \times \pi / 144$$

2. **Volume of dry gas sampled corrected to standard conditions, ft³.**

Note: V_m must be corrected for leakage if any leakage rates exceed L_a

$$V_{m(std)} = V_m \times 17.64 \times Y [(P_{bar} + (DH/13.6)) / (T_m + 460)]$$

3. **Average sampling rate per minute, dscfm.**

$$Q_m = V_{m(std)} / Q$$

4. **Absolute stack pressure, inches of Hg**

$$P_s = P_{bar} + (P_{static} / 13.6)$$

5. **Moisture content in the gas stream, % by volume.**

$$B_{ws} = V_{lc} \times 100 \times 0.04707 / ((V_{m(std)} + (V_{lc} \times 0.04707)))$$

6. **Moisture (at saturation), % by volume.**

$$B_{ws(sat)} = 10^{(6.691 - (3144 / (T_s + 390.86)))} / P_s \times 100$$

7. **Volume of water vapor at standard conditions, ft³.**

$$V_{wstd} = V_{lc} \times 0.04707$$

8. **Dry mole fraction**

Note:

If B_{ws} is $<$ $B_{ws(sat)}$

Then

$$1 - B_{ws} = 1 - (B_{ws} / 100)$$

If $B_{ws(sat)}$ is $<$ B_{ws}

Then

$$1 - B_{ws} = 1 - (B_{ws(sat)} / 100)$$

9. **Dry Molecular Weight, lb/lb•mole**

$$M_d = (CO_2 \times 0.44) + (O_2 \times 0.32) + (N_2 \times 0.28)$$

10. Wet Molecular Weight, lb/lb•mole

Note:

If B_{ws} is $< B_{ws(sat)}$

Then

$$M_s = (M_d \times 1 - B_{ws}) + (18 \times B_{ws} / 100)$$

If $B_{ws(sat)}$ is $< B_{ws}$

Then

$$M_s = (M_d \times 1 - B_{ws}) + (18 \times B_{ws(sat)} / 100)$$

11. Average stack gas velocity at stack conditions, ft/s

$$V_s = 85.49 \times C_p \times Dp^{1/2} \times [(T_s + 460) / (P_s \times M_s)]^{1/2}$$

12. Cross-sectional area of the stack, ft².

$$A = A_s / 144$$

13. Volumetric flow rate – wet basis at stack conditions, acfm

$$Q_a = V_s \times A \times 60$$

14. Volumetric flow rate – dry basis at standard conditions, dscfm

$$Q_s = Q_a \times 1 - B_{ws} \times P_s \times 17.64 / (T_s + 460)$$

15. Volumetric Flow Rate – dry basis at standard conditions, dscmm

$$Q_{sm} = Q_a \times 0.0283168466$$

16. Percent of isokinetic sampling, %

$$I = (0.0945 \times (T_s + 460) \times V_{m(std)}) / (1 - B_{ws} \times Q \times V_s \times P_s \times A_n)$$

17. Particulate concentration, grain/dscf

$$C_{pm} = PM \times 7 / 453.6 / V_{m(std)}$$

18. Particulate concentration, lb/dscf

$$C_{pmlb} = C_{pm} / 7000$$

19. Particulate mass emission rate, lb/hour

$$E_{pm} = C_{pmlb} \times Q_s \times 60$$

20. Metals concentration, µg/dscm

$$C_{metals} = M_{catch} / (V_{m(std)} \times 0.0283168466)$$

21. Metals mass emission rate, lb/hour

$$E_{metals} = C_{metals} \times Q_{sm} \times 60 \times 2.2E-09$$

**EXAMPLE CALCULATIONS FOR GASEOUS POLLUTANTS
MEASURED BY CONTINUOUS EMISSION MONITORS (CEMs)**

- 1) Concentrations, parts per million, dry basis:

$$\text{ppm, dry} = \text{ppm, wet basis} \div \left(1 - \frac{\text{BWS, \%}}{100} \right)$$

- 2) Concentrations, parts per million, corrected to 15% Oxygen:

$$\text{ppm, } O_2 \text{ corrected} = \frac{20.9 - 15}{20.9 - O_2, \text{ actual}} \times \text{ppm, dry}$$

- 3) Pollutant Mass Emission Rate, pounds per hour.

$$\text{PMR, lb/hr} = \frac{\text{ppm, dry} \times \text{Compound Molecular Weight}}{385,300,000 \text{ ft}^3/\text{mol}} \times \text{dscfm} \times 60$$

Molecular Weights of Target Compounds

TGO	=	Total Gaseous Organics	16.01 (Methane); 44.01 (Propane)
SO ₂	=	Sulfur Dioxide	64.05
NO ₂	=	Nitrogen Oxides	46.00
CO	=	Carbon Monoxide	28.01
HCL	=	Hydrogen Chloride	36.47
HF	=	Hydrogen Fluoride	20.01
BWS	=	Proportion by Volume of Water Vapor in the Gas Stream	
PMR	=	Pollutant Mass Emission Rate, pounds per hour	
DSCFM	=	Dry standard cubic feet per minute	
SCF/mol	=	385.3 x 10 ⁶	

Summary of Stack Gas Parameters and Test Results

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RUN NUMBER		B29-1	B29-2	B29-3	B29-4	
RUN DATE		8/13/2020	8/13/2020	8/13/2020	8/13/2020	Average
RUN TIME		0651-0815	1037-1227	1513-1725	1738-1939	
MEASURED DATA						
P _{static}	Stack Static Pressure, inches H ₂ O	-0.50	-0.90	-0.80	-0.60	-0.77
y	Meter Box Correction Factor	1.023	1.023	1.023	1.023	1.023
P _{bar}	Barometric Pressure, inches Hg	29.65	29.65	29.65	29.65	29.65
V _m	Sample Volume, ft ³	51.939	87.615	111.817	87.004	95.479
Dp ^{1/2}	Average Square Root Dp, (in. H ₂ O) ^{1/2}	0.9560	1.2470	1.2638	1.0482	1.1863
DH	Avg Meter Orifice Pressure, in. H ₂ O	1.68	2.78	2.84	1.99	2.54
T _m	Average Meter Temperature, °F	70	81	85	92	86
T _s	Average Stack Temperature, °F	133	149	145	151	148
V _{lc}	Condensate Collected, ml	18.3	15.6	29.1	21.9	22.2
CO ₂	Carbon Dioxide content, % by volume	0.2	0.2	0.2	0.4	0.2
O ₂	Oxygen content, % by volume	20.7	20.7	20.7	21.0	20.8
N ₂	Nitrogen content, % by volume	79.1	79.2	79.1	78.7	79.0
C _p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84	0.84
	Circular Stack? 1=Y,0=N:	1	1	1	1	
AS	Diameter or Dimensions, inches:	152.00	152.00	152.00	152.00	152.00
Q	Sample Run Duration, minutes	73	96	121	112	109
D _n	Nozzle Diameter, inches	0.210	0.210	0.210	0.210	0.210
CALCULATED DATA						
A _n	Nozzle Area, ft ²	0.000241	0.000241	0.000241	0.000241	0.000241
V _{m(std)}	Standard Meter Volume, ft ³	52.653	87.250	110.550	84.749	94.183
V _{m(std)}	Standard Meter Volume, m ³	1.491	2.471	3.130	2.400	2.667
Q _m	Average Sampling Rate, dscfm	0.721	0.909	0.917	0.760	0.862
P _s	Stack Pressure, inches Hg	29.61	29.58	29.59	29.61	29.59
B _{ws}	Moisture, % by volume	1.6	0.8	1.2	1.2	1.1
B _{ws(sat)}	Moisture (at saturation), % by volume	16.5	24.9	22.5	26.1	24.5
V _{wstd}	Standard Water Vapor Volume, ft ³	0.861	0.734	1.370	1.031	1.045
1-B _{ws}	Dry Mole Fraction	0.984	0.992	0.988	0.988	0.989
M _d	Molecular Weight (d.b.), lb/lb·mole	28.86	28.85	28.86	28.90	28.87
M _s	Molecular Weight (w.b.), lb/lb·mole	28.69	28.76	28.73	28.76	28.75
V _s	Stack Gas Velocity, ft/s	57.4	75.8	76.6	63.8	72.0
A	Stack Area, ft ²	126.0	126.0	126.0	126.0	126.01
Q _a	Stack Gas Volumetric flow, acfm	433,649	572,792	578,890	482,066	544,583
Q _s	Stack Gas Volumetric flow, dscfm	375,855	486,735	493,348	407,091	462,392
Q _s	Stack Gas Volumetric flow, dscmm	10,643	13,783	13,970	11,528	13,093
I	Isokinetic Sampling Ratio, %	100.6	97.8	97.4	97.8	97.7

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<i>RUN NUMBER</i>	<i>B29-1</i>	<i>B29-2</i>	<i>B29-3</i>	<i>B29-4</i>	
<i>RUN DATE</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>Average</i>
<i>RUN TIME</i>	<i>0651-0815</i>	<i>1037-1227</i>	<i>1513-1725</i>	<i>1738-1939</i>	
EMISSIONS DATA					
<u>Lead Front</u>					
Pb	Target Catch, µg	0.9	0.9	0.9	0.9
C _{Pb}	Concentration, µg/dscm	0.6	0.4	0.3	0.4
E _{Pb}	Emission Rate, lb/hr	8.86E-04	6.92E-04	5.54E-04	5.96E-04
<u>Lead Back</u>					
Pb	Target Catch, µg	0.5	0.5	0.5	0.5
C _{Pb}	Concentration, µg/dscm	0.3	0.2	0.2	0.2
E _{Pb}	Emission Rate, lb/hr	4.52E-04	3.53E-04	2.83E-04	3.04E-04
<u>Total Lead</u>					
Pb	Target Catch, µg	1.4	1.4	1.4	1.4
C _{Pb}	Concentration, µg/dscm	1.0	0.6	0.5	0.6
E _{Pb}	Emission Rate, lb/hr	1.34E-03	1.05E-03	8.36E-04	9.00E-04
<u>Manganese Front</u>					
Mn	Target Catch, µg	1.5	48.4	85.1	25.1
C _{Mn}	Concentration, µg/dscm	1.0	19.6	27.2	10.5
E _{Mn}	Emission Rate, lb/hr	1.39E-03	3.56E-02	5.01E-02	1.59E-02
<u>Manganese Back</u>					
Mn	Target Catch, µg	2.2	1.0	2.0	1.3
C _{Mn}	Concentration, µg/dscm	1.5	0.4	0.7	0.5
E _{Mn}	Emission Rate, lb/hr	2.09E-03	7.58E-04	1.20E-03	8.24E-04
<u>Total Manganese</u>					
Mn	Target Catch, µg	3.7	49.4	87.1	26.4
C _{Mn}	Concentration, µg/dscm	2.5	20.0	27.8	11.0
E _{Mn}	Emission Rate, lb/hr	3.48E-03	3.64E-02	5.13E-02	1.67E-02

Note - Averages are for Runs 2-4. Lead results were on below detection limit. DL was used as the results.

AK Steel Dearborn Works C-Furnace Baghouse Metals Calculations

Run 1 (Results in ug/sample)

	S-29-1 M29 FH	S-29-1 M29 BH	FH Blank Correction	BH Blank Correction	S-29-1 M29 FH (adjusted)	S-29-1 M29 BH (adjusted)
Lead	0.94	0.48	0.00	0.00	0.94	0.48
Manganese	2.09	2.22	0.62	0.00	1.471	2.22

MDL Used in Analysis
J Qualifier

"A" as calculated by Method 29 for an 83 mm Filter is 8.4 ug. Since the front half blank correction is less than "A", the full correction can be applied

Run 2 (Results in ug/sample)

	S-29-2 M29 FH	S-29-2 M29 BH	FH Blank Correction	BH Blank Correction	S-29-2 M29 FH (adjusted)	S-29-2 M29 BH (adjusted)
Lead	0.94	0.48	0.00	0.00	0.94	0.48
Manganese	49	1.03	0.62	0.00	48.381	1.03

MDL Used in Analysis
J Qualifier

"A" as calculated by Method 29 for an 83 mm Filter is 8.4 ug. Since the front half blank correction is less than "A", the full correction can be applied

Run 3 (Results in ug/sample)

	S-29-3 M29 FH	S-29-3 M29 BH	FH Blank Correction	BH Blank Correction	S-29-3 M29 FH (adjusted)	S-29-3 M29 BH (adjusted)
Lead	0.94	0.48	0.00	0.00	0.94	0.48
Manganese	85.7	2.04	0.62	0.00	85.081	2.04

MDL Used in Analysis
J Qualifier

"A" as calculated by Method 29 for an 83 mm Filter is 8.4 ug. Since the front half blank correction is less than "A", the full correction can be applied

Run 4 (Results in ug/sample)

	S-29-3 M29 FH	S-29-3 M29 BH	FH Blank Correction	BH Blank Correction	S-29-3 M29 FH (adjusted)	S-29-3 M29 BH (adjusted)
Lead	0.94	0.48	0.00	0.00	0.94	0.48
Manganese	25.7	1.3	0.62	0.00	25.081	1.30

MDL Used in Analysis
J Qualifier

"A" as calculated by Method 29 for an 83 mm Filter is 8.4 ug. Since the front half blank correction is less than "A", the full correction can be applied

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<i>RUN NUMBER</i>	<i>B-202-1</i>	<i>B-202-2</i>	<i>B-202-3</i>	<i>B-202-4</i>	<i>Average</i>	
<i>RUN DATE</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>		
<i>RUN TIME</i>	<i>0651-0815</i>	<i>1037-1227</i>	<i>1513-1725</i>	<i>1738-1939</i>		
MEASURED DATA						
P _{static}	Stack Static Pressure, inches H ₂ O	-0.60	-0.90	-0.83	-0.56	-0.76
y	Meter Box Correction Factor	0.996	0.996	0.996	0.996	0.996
P _{bar}	Barometric Pressure, inches Hg	29.65	29.65	29.65	29.65	29.65
V _m	Sample Volume, ft ³	52.807	94.780	114.341	86.223	98.448
Dp ^{1/2}	Average Square Root Dp, (in. H ₂ O) ^{1/2}	0.9429	1.3217	1.2507	0.9971	1.1898
DH	Avg Meter Orifice Pressure, in. H ₂ O	1.71	3.41	3.05	1.97	2.81
T _m	Average Meter Temperature, °F	68	79	84	90	84
T _s	Average Stack Temperature, °F	133	148	144	151	148
V _{lc}	Condensate Collected, ml	18.0	26.5	22.6	25.0	24.7
CO ₂	Carbon Dioxide content, % by volume	0.2	0.2	0.2	0.4	0.2
O ₂	Oxygen content, % by volume	20.7	20.7	20.7	21.0	20.8
N ₂	Nitrogen content, % by volume	79.1	79.2	79.1	78.7	79.0
C _p	Pitot Tube Coefficient	0.84	0.84	0.84	0.84	0.84
	Circular Stack? 1=Y,0=N:	1	1	1	1	
As	Diameter or Dimensions, inches:	152.00	152.00	152.00	152.00	152.00
Q	Sample Run Duration, minutes	73	96	121	112	109
D _n	Nozzle Diameter, inches	0.210	0.210	0.210	0.210	0.210
CALCULATED DATA						
A _n	Nozzle Area, ft ²	0.000241	0.000241	0.000241	0.000241	0.000241
V _{m(std)}	Standard Meter Volume, ft ³	52.321	92.378	110.321	82.065	94.921
Q _m	Average Sampling Rate, dscfm	0.717	0.962	0.916	0.736	0.871
P _s	Stack Pressure, inches Hg	29.61	29.58	29.59	29.61	29.59
B _{ws}	Moisture, % by volume	1.6	1.3	1.0	1.4	1.2
B _{ws(sat)}	Moisture (at saturation), % by volume	16.5	24.3	22.0	26.1	24.1
V _{wstd}	Standard Water Vapor Volume, ft ³	0.847	1.247	1.064	1.177	1.163
1-B _{ws}	Dry Mole Fraction	0.984	0.987	0.990	0.986	0.988
M _d	Molecular Weight (d.b.), lb/lb•mole	28.86	28.85	28.86	28.90	28.87
M _s	Molecular Weight (w.b.), lb/lb•mole	28.69	28.71	28.76	28.74	28.74
V _s	Stack Gas Velocity, ft/s	56.6	80.3	75.7	60.7	72.2
A	Stack Area, ft ²	126.0	126.0	126.0	126.0	126.01
Q _a	Stack Gas Volumetric flow, acfm	427,747	607,176	572,147	458,727	546,017
Q _s	Stack Gas Volumetric flow, dscfm	370,708	514,208	489,701	386,589	463,500
Q _s	Stack Gas Volumetric flow, dscmm	10,497	14,561	13,867	10,947	13,125
I	Isokinetic Sampling Ratio, %	101.3	98.1	98.0	99.8	98.6

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AK Steel - Dearborn Works

US EPA Test Method 5/202 - Particulate Matter

C Furnace Baghouse

Page 2 of 2

<i>RUN NUMBER</i>	<i>B-202-1</i>	<i>B-202-2</i>	<i>B-202-3</i>	<i>B-202-4</i>	<i>Average</i>	
<i>RUN DATE</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>	<i>8/13/2020</i>		
<i>RUN TIME</i>	<i>0651-0815</i>	<i>1037-1227</i>	<i>1513-1725</i>	<i>1738-1939</i>		
<u>EMISSIONS DATA</u>						
<u>Particulate Matter</u>						
PM	Filter Weight Gain, mg	0.05	0	0.15	0.3	
PM	Beaker Weight Gain, mg	1.6	2.8	2.85	3.55	
PM	Total Catch, g	0.0017	0.0028	0.0030	0.0039	0.0032
C _{PM}	Concentration, gr/dscf	4.87E-04	4.68E-04	4.20E-04	7.24E-04	5.37E-04
C _{PM}	Concentration, lb/dscf	6.95E-08	6.68E-08	6.00E-08	1.03E-07	7.67E-08
E _{PM}	Emission Rate, lb/hr	1.55	2.06	1.76	2.40	2.07
<u>Inorganic Condensable Particulate</u>						
IC PM	Weight gain, mg	0.29	0.49	0.99	1.09	
PM	Total Catch, g	0.000	0.000	0.001	0.001	
C _{PM}	Concentration, gr/dscf	8.55E-05	8.19E-05	1.38E-04	2.05E-04	1.42E-04
C _{PM}	Concentration, lb/dscf	1.22E-08	1.17E-08	1.98E-08	2.93E-08	2.03E-08
E _{PM}	Emission Rate, lb/hr	0.27	0.36	0.58	0.68	0.54
<u>Organic Condensable Particulate</u>						
PM	Weight gain, mg	11.71	3.51	3.51	10.71	
PM	Total Catch, g	0.012	0.004	0.004	0.011	
C _{PM}	Concentration, gr/dscf	3.45E-03	5.86E-04	4.91E-04	2.01E-03	1.03E-03
C _{PM}	Concentration, lb/dscf	4.93E-07	8.38E-08	7.01E-08	2.88E-07	1.47E-07
E _{PM}	Emission Rate, lb/hr	10.97	2.58	2.06	6.67	3.77
<u>Total Condensable Particulate</u>						
C _{PM}	Concentration, gr/dscf	3.54E-03	6.68E-04	6.29E-04	2.22E-03	1.17E-03
E _{PM}	Emission Rate, lb/hr	11.24640094	2.945164708	2.642187629	7.352756722	4.31
<u>Total Particulate</u>						
C _{PM}	Concentration, gr/dscf	4.03E-03	1.14E-03	1.05E-03	2.94E-03	1.71E-03
E _{PM}	Emission Rate, lb/hr	12.79	5.01	4.40	9.75	6.39

Note - Averages are for Runs 2-4

AK Steel Dearborn Works C-Furnace Baghouse CPM Calculations

Run 1 (Results in mg/sample)

	B-202-1	Field Blank	Maximum Allowable Blank Correction	Net Weight
Organic CPM	13	3.1	1.29	11.71
Inorganic CPM	1.0	1.7	0.71	0.29

Run 2 (Results in mg/sample)

	B-202-2	Field Blank	Maximum Allowable Blank Correction	Net Weight
Organic CPM	4.8	3.1	1.29	3.51
Inorganic CPM	1.2	1.7	0.71	0.49

Run 3 (Results in mg/sample)

	B-202-3	Field Blank	Maximum Allowable Blank Correction	Net Weight
Organic CPM	4.8	3.1	1.29	3.51
Inorganic CPM	1.7	1.7	0.71	0.99

Run 4 (Results in mg/sample)

	B-202-4	Field Blank	Maximum Allowable Blank Correction	Net Weight
Organic CPM	12	3.1	1.29	10.71
Inorganic CPM	1.8	1.7	0.71	1.09

Note: Maximum allowable field blank correction is 2 mg. Assigned maximum blank corrections based on ratio of field blank results

MDL Used in Analysis

CEM Data Correction Data Sheet

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Date:	8/13/2020
Project Number:	50074.0221
CEM Operator:	Chris Janzen
Pollutant:	CO
Molecular Weight:	28.01

Run No.	Start-Stop Time	Raw Data (ppm)	Calibration Data			Stack Flow (dscfm)	Stack O2 Conc. (%)	Calibration Corrected Data (% or ppm)	Mass Emission Rate (lb/hr)	Process Data (tons/hr)	Mass Emission Rate (lb/ton)
			Cma	Co	Cm						
1	06:52-08:15	25.1	90.1	0.6	90.2	373,282	20.7	24.6	40.09	413.8	0.10
2	10:37-12:26	19.8	90.1	1.0	89.8	500,472	20.7	19.1	41.70	245.5	0.17
3	15:14-17:24	17.2	90.1	1.2	89.8	491,525	21.0	16.3	35.03	270.7	0.13
4	17:38-19:37	18.4	90.1	0.3	89.6	396,840	20.8	18.3	31.68	271.2	0.12
Average								17.9	36.14	262.5	0.14

Note - Averages are for runs 2-4

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

Oxygen Corrected Data

$$C = C_{gas} * ((20.9 - O_2 \text{ fact}) / (20.9 - O_2 \text{ obs}))$$

Mass Emission Rate (lb/hr)

$$E \text{ (lb/hr)} = C_{gas} * MW_{gas} * Q_s \text{ (dscfm)} * 60 / 3853000000$$

Mass Emission Rate (lb/MMBtu)

$$E \text{ (lb/MMBtu)} = C_{gas} * MW_{gas} * F_d * (20.9 / (20.9 - O_2 \text{ obs})) / 3853000000$$

Pollutant	MW _{gas}
CO	28.01
Methane	16.01
NOx	46.01
SO2	64.06

DS

CEM Data Correction Data Sheet

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Date:	8/13/2020
Project Number:	50074.0221
CEM Operator:	Chris Janzen
Pollutant:	CO2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	06:52-08:15	0.4	11.0	0.1	11.0	0.2
2	10:37-12:26	0.3	11.0	0.1	11.0	0.2
3	15:14-17:24	0.3	11.0	0.1	11.0	0.2
4	17:38-19:37	0.5	11.0	0.1	11.0	0.4
Average						0.2

Note - Averages are for runs 2-4

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

CEM Data Correction Data Sheet

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Date:	8/13/2020
Project Number:	50074.0221
CEM Operator:	Chris Janzen
Pollutant:	O2
Molecular Weight:	

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
			Cma	Co	Cm	
1	06:52-08:15	20.7	22.0	0.1	22.0	20.7
2	10:37-12:26	20.7	22.0	0.0	22.0	20.7
3	15:14-17:24	20.6	22.0	0.0	22.0	20.7
4	17:38-19:37	20.9	22.0	-0.1	22.0	21.0
Note - Averages are for runs 2-4					Average	20.8

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

Total Gaseous Organics Data Correction

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Date:	8/13/2020
Project Number:	50074.022
CEM Operator:	Chris Janzen
Pollutant:	TGO
Molecular Weight:	16.01

Run No.	Start-Stop Time	Raw Data (ppm)	Source Information			Total HC Data Dry Basis (ppm)	Methane Data Dry Basis (ppm)	NMHC Data Dry Basis (ppm)	Mass Emission Rate (lb/hr)	Process Data (tons/hr)	Mass Emission Rate (lb/ton)
			Stack Flow (dscfm)	Stack Moisture (%)	Stack O2 Conc. (%)						
1	06:52-08:15	45.7	373,282	1.62	20.7	46.4	16.0	30.4	28.31	413.8	6.84E-02
2	10:37-12:26	26.0	500,472	1.33	20.7	26.4	29.0	1.0	1.25	245.5	5.08E-03
3	15:14-17:24	23.7	491,525	0.96	21.0	23.9	20.0	3.9	4.84	270.7	1.79E-02
4	17:38-19:37	16.0	396,840	1.41	20.8	16.2	16.0	1.0	0.99	271.2	3.65E-03
					Average	22.2	21.7	2.0	2.36	262.5	8.86E-03

Note - Averages are for runs 2-4. 1 PPM was used as the MDL for VOC when calculated NMHC was less than 1 ppm
Moisture Correction

$$C_{gas(dry)} = C_{gas(wet)} / (1 - (\% \text{ moisture}/100))$$

Oxygen Corrected Data

$$C = C_{gas} * ((20.9 - O_2 \text{ fact}) / (20.9 - O_2 \text{ obs})) ; \text{ all dry basis}$$

Mass Emission Rate (lb/hr)

$$E \text{ (lb/hr)} = C_{gas(dry)} * MW_{gas} * Q_s \text{ (dscfm)} * 60 / 3853000000$$

CEM Data Correction Data Sheet

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Date:	8/13/2020
Project Number:	50074.0221
CEM Operator:	Chris Janzen
Pollutant:	N0x
Molecular Weight:	46.01

Run No.	Start-Stop Time	Raw Data (% or ppm)	Calibration Data		Stack Flow (dscfm)	Stack O2 Conc. (%)	Calibration Corrected Data (% or ppm)	Mass Emission Rate (lb/hr)	Process Data (tons/hr)	Mass Emission Rate (lb/ton)
			Cma	Co						
1	06:52-08:15	1.1	46.0	0.0	373,282	20.7	1.1	2.95	413.8	7.14E-03
2	10:37-12:26	0.9	46.0	0.0	500,472	20.7	0.9	3.25	245.5	1.33E-02
3	15:14-17:24	0.7	46.0	0.0	491,525	20.7	0.7	2.43	270.7	8.98E-03
4	17:38-19:37	0.5	46.0	0.0	396,840	21.0	0.5	1.41	271.2	5.21E-03
Average							0.7	2.37	262.5	9.15E-03

Note - Averages are for runs 2-4

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

Oxygen Corrected Data

$$C = C_{gas} * ((20.9 - O_2 \text{ fact}) / (20.9 - O_2 \text{ obs}))$$

Mass Emission Rate (lb/hr)

$$E \text{ (lb/hr)} = C_{gas} * MW_{gas} * Q_s \text{ (dscfm)} * 60 / 3853000000$$

Mass Emission Rate (lb/MMBtu)

$$E \text{ (lb/MMBtu)} = C_{gas} * MW_{gas} * F_d * (20.9 / (20.9 - O_2 \text{ obs})) / 3853000000$$

Pollutant	MW/gas
CO	28.01
Propane	44.10
NOx	46.01
SO2	64.06

✓
DS

Table A-1. Run 1 Results (Voided)

Pollutant	Run 1
PM (lb/hr)	1.6
PM ₁₀ (lb/hr)	12.8
PM _{2.5} (lb/hr)	12.8
Mn (lb/hr)	0.003
Lead (lb/hr)	0.001
VOC (lb/hr)	28.3 ^a
NO _x (lb/hr)	3.0
CO (lb/hr)	40.1
VE	0% ^b

^a VOC analyzer would not calibrate after the run was stopped. There was a high contamination resulting in high values.

^b Calculated as highest observed 6-minute average.

APPENDIX B

FIELD DATA

FIELD DATA SHEET

Plant: AK Dearborn Sample Type: ppm/stack Operator: RK/JP/AG Nozzle ID: O₂ 210 Thermocouple #: 6-10
 Sampling Location: C For use BA P_{bar}: 29.65 Ps: -0.50 Assumed Bws: 2 Filter #: 276080
 Run Number: B-29-1 Date: 8/12/20 CO₂: 0.5 O₂: 20 Meter Box #: 11 Y: L023 ΔH@: 1.767
 Pretest Leak Rate: 0.0 cfm @ 12 in.Hg. Pitot#: 6-10 Post-Test Leak Rate: 0.021 cfm @ 3 in.Hg.
 Pretest Leak Check: Pitot: √± Orsat: — Stack Diameter: 15.2" K: 1.986 Post-Test Leak Check: Pitot: √ Orsat: —

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
0	0651	416.448	0.85	1.50	1.50	150	249	249	64	82	81	2		
4	0655	419.4	0.92	1.7	1.7	117	248	245	64	66	65	3		
8	0703	422.2	0.90	1.7	1.7	715	251	249	63	66	65	3		
12	0707	425.3	0.95	1.7	1.7	117	252	251	62	67	66	3		
16	0712	430.0	0.92	1.7	1.7	120	250	251	60	67	66	3		
20	0716	433.7	0.85	1.6	1.6	107	250	251	60	69	67	3		
24	0720	436.5	0.90	1.7	1.7	129	248	251	62	69	68	3		
28	0730	439.5	0.95	1.7	1.7	128	248	249	61	70	68	3		
32	0734	442.2	0.95	1.7	1.7	130	249	250	60	70	68	3		
36	0738	445.4	0.90	1.7	1.7	130	250	250	60	71	69	3		
40	0742	448.0	0.88	1.7	1.7	131	251	250	61	72	69	3		
44	0746	450.7	0.85	1.6	1.6	134	251	250	61	72	69	3		
48	0754	454.0	0.95	1.7	1.7	136	254	250	63	71	70	3		
52	0758	456.1	0.90	1.7	1.7	140	250	251	64	72	70	3		
56	0802	459.5	0.95	1.7	1.7	144	250	251	65	73	70	3		
60	0806	462.0	0.95	1.7	1.7	146	250	251	66	73	70	3		
64	0810	465.0	0.95	1.7	1.7	147	252	250	63	73	70	3		
68	0814	467.8	0.90	1.7	1.7	150	250	250	62	74	71	3		
72	0815	468.544	0.95	1.7	1.7	158	249	251	61	74	71	3		
76	0815	468.544	0.90	1.7	1.7	158	246	248	60	72	71	3		
80														
84														
88														
92														
96														

T_m = 70

$\Delta V_m = 51.937 \sqrt{\Delta P} = 0.9560 \Delta H = 1.68 T_s = 133$

$\Delta P = 0.91$

Valid

SAMPLE RECOVERY DATA

Plant AK Dearborn Run No. B-29-1
 Date 8/13/20 Sample Box No. ASB-3 Job No. 0597M.0221
 Sample Location C FURNACE B4 Filter No. 276080
 Train Preparer BK/IEZ Sample Head No. 13
 Sample Recovery Person CJ Barometer No. Weather App
 Comments M29 Balance No. FB-8

Front Half

Acetone B-29-1 Liquid
 Container No. FH ACE / MIDDLE RINSE Level Marked Sealed

Filter
 Container No. 276080 Sealed

Description of Filter no load

Samples Stored and Locked

Back Half/Moisture

Container No. B-29-1 5% / 10% / MT

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	5% / 10%	100	781.3	780.6	= 0.7
2	5% / 10%	100	738.4	744.2	5.8
3	-	-	667.8	670.3	2.5
4	Silica Gel	250g	967.9	978.6	10.7
5					
6					
7	Silica Gel		967.9		18.3

Description of Impinger Catch: claw

✓ OS

FIELD DATA SHEET

Plant: AK Deabosw Sample Type: Metal Operator: AK/NJ Nozzle ID: 0.2/0 Thermocouple #: 6-10
 Sampling Location: C Tower 3/1 P_{bar}: 29.65 P_s: 0.90 Assumed B_{ws}: 2 Filter #: 27608
 Run Number: B-28-2 Date: 8/13/20 CO₂: 20.0 Meter Box #: 11 Y: 1.023 ΔH@: 1.767
 Pretest Leak Rate: 0.2 cfm @ 19 in.Hg. Probe Length/Type: 6/6 Pitot#: 6-10 Post-Test Leak Rate: 0.4 cfm @ 8 in.Hg.
 Pretest Leak Check: Pitot: 1 Orsat: - Stack Diameter: 15.2" K: 1.986 Post-Test Leak Check: Pitot: 1 Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
	0	1037	470.60											
1a	4	1041	473.8	1.5	2.6	158	249	249	68	75	75	4		
b	8	1045	477.7	1.5	2.6	147	250	250	67	75	75	4		
2a	12	1049	480.7	1.0	1.8	142	235	235	66	76	76	4		
b	16	1053	483.9	1.0	1.8	144	237	237	65	76	76	4		
3a	20	1057	487.1	1.1	1.9	144	235	235	65	77	77	4		
b	24	1101	489.8	1.1	1.9	143	234	234	63	77	77	4		
1a	28	1109	493.7	1.9	3.4	140	240	238	64	78	77	5		
b	32	1113	498.0	1.8	3.2	144	235	237	65	80	77	5		
2a	36	1117	501.3	1.5	2.7	142	235	235	65	82	78	5		
b	40	1121	504.9	1.6	2.8	140	239	236	66	82	78	5		
3a	44	1125	508.6	1.6	2.8	140	235	236	66	83	79	5		
b	48	1129	512.37	1.6	2.8	147	237	237	68	83	79	5		
1a	52	1133	516.2	1.7	3.0	140	232	230	68	82	80	5		
b	56	1137	520.1	1.7	3.0	150	234	234	60	84	80	5		
2a	60	1141	524.2	1.6	2.8	151	233	235	57	84	81	5		
b	64	1145	527.6	1.7	3.0	152	236	236	57	85	81	5		
3a	68	1149	531.2	1.8	3.2	154	233	233	58	85	81	5		
b	72	1153	535.2	1.8	3.2	145	233	236	58	86	82	5		
1a	76	1157	539.1	1.9	3.4	153	240	238	68	84	83	5		
b	80	1205	543.2	1.9	3.4	158	234	231	63	84	83	5		
2a	84	1209	547.4	1.8	3.2	159	236	232	59	85	83	5		
b	88	1213	551.2	1.8	3.2	157	234	236	60	86	83	5		
3a	92	1217	555.1	1.8	3.2	163	233	231	62	86	83	5		
b	96	1223	559.1	1.8	3.2	160	233	237	62	86	83	5		
		1227	563.75	1.0	1.8	160	233	237	62	86	83	5		

$\bar{T}_m = 81$

$\Delta V_m = 87.615$ $\sqrt{\Delta p} = 1.2470$ $\Delta H = 2.78$ $T_s = 149$

1.5708

12/27/20
1.5708

SAMPLE RECOVERY DATA

Plant AK DEARBORN Run No. B-29-2
 Date 8/13/20 Sample Box No. _____ Job No. 050074.0221
 Sample Location C FURNACE BH Filter No. 276087
 Train Preparer CS Sample Head No. 5
 Sample Recovery Person CS Barometer No. 8
 Comments _____ Balance No. 4

Front Half

Acetone B-29-2 Liquid
 Container No. PH ACE/ NITEN RWIG Level Marked _____ Sealed _____

Filter

Container No. 276087 Sealed _____

Description of Filter minimal loading

Samples Stored and Locked _____

Back Half/Moisture

Container No. B-29-2 5.1/10.1 / MT

Liquid Level Marked _____ Sealed _____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	5.1/10.1	100	802.2	788.8	-13.4
2	5.1/10.1	100	778.0	768.0	-10.0
3	—	—	658.8	692.0	33.2
4	SG	250	992.6	998.4	5.8
5					
6					
Total					15.6

Description of Impinger Catch: clear

FIELD DATA SHEET

Plant: AK Desboro Sample Type: Metals Operator: R4/NP/JG Nozzle ID: 0.210 Thermocouple #: 6-10
 Sampling Location: C.F. Jura BH Ps: -0.80" Assumed Bws: 2 Filter #: 276082
 Run Number: B-29-3 Date: 8/13/20 CO₂: 0.5 O₂: 20.0 Meter Box #: 11 Y: 1.023 ΔH@: 1.767
 Pretest Leak Rate: 0.00 cfm @ 10 in. Hg. Pitot#: 6-10 Post-Test Leak Rate: 0.02 cfm @ 10 in. Hg.
 Pretest Leak Check: Pitot: ✓ Orsat: — Stack Diameter: 152" K: 1.986 Post-Test Leak Check: Pitot: ✓ Orsat: —

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature of		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
1	a	3.5	558.565	1.4	2.4	2.4	142	236	234	68		82	82	3
	b	7.0	562.0	1.4	2.4	2.4	140	233	236	67		82	82	3
2	a	10.5	567.0	0.90	1.6	1.6	146	235	232	68		82	82	3
	b	14.0	569.6	0.95	1.7	1.7	147	236	233	67		82	82	3
3	a	17.5	573.1	1.60	2.8	2.8	146	233	233	69		82	82	3
	b	21.0	576.095	1.60	2.8	2.8	145	236	234	68		82	82	3
1	a	24.5	578.8	1.50	2.7	2.7	144	234	238	67		83	82	3
	b	28.0	582.8	1.50	2.7	2.7	146	230	232	68		83	82	4
2	a	30.5	585.7	1.60	2.8	2.8	145	234	235	66		84	83	4
	b	35.0	588.8	1.60	2.8	2.8	145	235	232	63		85	83	4
3	a	38.5	592.2	1.60	2.8	2.8	145	233	234	60		85	83	4
	b	42.0	595.4	1.40	2.4	2.4	144	236	238	60		86	83	4
1	a	45.5	598.3	1.40	2.4	2.4	140	233	239	68		86	84	3
	b	49.0	601.7	1.70	3.0	3.0	143	232	238	66		86	84	3
2	a	52.5	605.2	1.70	3.0	3.0	143	232	237	65		86	84	4
	b	56.0	608.4	1.80	3.2	3.2	144	232	231	65		86	84	4
3	a	59.5	611.8	1.70	3.0	3.0	145	237	233	65		86	84	4
	b	63.0	615.2	1.70	3.0	3.0	146	234	232	66		87	85	4
1	a	66.5	618.4	1.60	2.9	2.9	141	234	241	66		87	85	4
	b	70.0	621.9	1.80	3.2	3.2	144	230	233	67		87	85	4
2	a	73.5	625.2	1.70	3.0	3.0	145	235	234	67		88	85	4
	b	77.0	628.7	1.70	3.0	3.0	145	235	237	67		88	85	4
3	a	80.5	632.1	1.70	3.1	3.1	145	234	231	68		88	86	5
	b	84.0	635.4	1.70	3.1	3.1	144	232	232	66		88	86	5

ΔV_m = $\sqrt{\Delta p}$ ΔH = $\frac{\Delta H}{T_s}$ T_m =

Page 2

FIELD DATA SHEET

Plant: Alk Leadbar Sample Type: Metals Operator: Rig/NP/JG
 Sampling Location: C. Furnace P_{bar}: 29.65 P_s: 1.00
 Run Number: 13-29-3 Date: 8/1/20 CO₂: 0.5 O₂: 20
 Pretest Leak Rate: 0.2 cfm @ 10 in.Hg. Probe Length/Type: 6' 6" Pitot#: 6-10
 Pretest Leak Check: Pitot: ✓ Orsat: - Stack Diameter: 15.2" K: 1.9810

Nozzle ID: 0.210 Thermocouple #: 6-10
 Assumed BWS: 2 Filter #: 276082
 Meter Box #: 11 Y: 1.023 ΔH@: 1.767
 Post-Test Leak Rate: 0.02 cfm @ 10 in.Hg.
 Post-Test Leak Check: Pitot: ✓ Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
1c	8:40	1645	635.4	1.70	3.1	3.1	144	233	234	65		88	86	5
b	8:46	1649	638.8	1.70	3.1	3.1	144	234	233	64		88	86	5
2a	9:10	1653	642.2	1.80	3.2	3.2	145	234	233	64		88	86	5
b	9:15	1656	645.7	1.70	3.0	3.0	146	231	230	64		89	86	5
3a	9:20	1700	649.1	1.70	3.0	3.0	146	234	235	65		89	86	5
b	10:15	1703	652.4	1.70	3.0	3.0	146	233	235	66		89	87	5
1c	10:5	1707	655.7	1.70	2.9	2.9	146	236	230	68		89	87	5
b	10:8.5	1713	659.1	1.60	2.9	2.9	142	236	230	68		89	87	5
b	11:2	1716	662.1	1.70	3.0	3.0	148	232	233	68		89	87	5
2a	11:5.5	1720	665.5	1.70	3.0	3.0	148	233	232	62		90	87	5
b	11:9.0	1725	670.302	1.70	3.0	3.0	150	235	235	63		90	87	5
3a	12:1.5			1.70	3.0	3.0	151	236	234	64		90	88	5
p	12:0.0													
	120.5													
	minutes													

ΔV_m = 111.817 $\sqrt{\Delta p} = 1.2638$ ΔH = 2.84 T_s = 145
 T_m = 85
 1.604

SAMPLE RECOVERY DATA

Plant AK DEARBORN Run No. B-29-3
 Date 8/13/20 Sample Box No. _____ Job No. 050074-0221
 Sample Location C FURNACE BH Filter No. 276082
 Train Preparer CJ Sample Head No. 13
 Sample Recovery Person CJ Barometer No. _____
 Comments _____ Balance No. 4

Front Half

Acetone B-29-3 Liquid _____
 Container No. FR ACE / Nitro tubes Level Marked Sealed

Filter
 Container No. 276082 Sealed

Description of Filter minimal loading

Samples Stored and Locked _____

Back Half/Moisture

Container No. B-29-3 5% / 10% / MT

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	<u>5% / 10%</u>	<u>100</u>	<u>776.4</u>	<u>771.5</u>	<u>-4.9</u>
2	<u>5% / 10%</u>	<u>100</u>	<u>736.9</u>	<u>750.4</u>	<u>13.5</u>
3	<u>—</u>	<u>—</u>	<u>667.6</u>	<u>668.3</u>	<u>0.7</u>
4	<u>80</u>	<u>250</u>	<u>978.6</u>	<u>998.4</u>	<u>19.8</u>
5					
6					
Total					<u>29.1</u>

Description of Impinger Catch: clear

✓

FIELD DATA SHEET

Plant: AK Dearborn Sample Type: Mutols Operator: RLNP/JG
 Sampling Location: 9 In. In. 317 P_{bar}: 29.62 Ps: -0.600 O₂: 20.0
 Run Number: B-29-4 Date: 8/17/20 CO₂: 0.5
 Pretest Leak Rate: 0.02 cfm @ 10 in.Hg. Pitot#: 6-10
 Pretest Leak Check: Pitot: ✓ Orsat: - Stack Diameter: 15.2" K: 6.986

Nozzle ID: 0.210 Thermocouple #: 6-10
 Assumed BWS: 2 Filter #: 21608
 Meter Box #: 11 Y: 1.023 ΔH@: 1.267
 Post-Test Leak Rate: cfm @ in.Hg.
 Post-Test Leak Check: Pitot: Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature of F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
	0	1798	670.728											
1a	3.5	1741	673.7	1.4	2.5	143	226	230	68	88	88	88	4	
1b	7.0	1744	676.7	1.4	2.5	143	228	233	67	88	88	88	4	
2a	10.5	1748	679.3	0.87	1.6	150	228	237	65	89	89	89	4	
2b	14.0	1752	681.7	0.90	1.6	151	230	238	65	89	89	89	4	
3a	17.5	1755	684.3	0.90	1.6	152	230	240	61	89	89	89	4	
1b	21.0	1759	686.770	0.90	1.6	152	230	240	60	89	89	89	4	
1a	24.5	1805	689.0	0.80	1.4	145	231	239	64	89	89	89	3	
1b	28.0	1808	691.4	0.80	1.4	150	232	233	60	90	90	90	3	
2a	31.5	1812	693.8	0.80	1.4	153	236	233	60	90	90	90	3	
1b	35.0	1816	696.1	0.78	1.4	155	234	235	61	90	90	90	3	
3a	38.5	1820	698.4	0.78	1.4	155	232	237	62	90	90	90	3	
1b	42.0	1823	700.7	0.75	1.3	155	231	238	63	93	93	93	3	
1a	45.5	1828	703.1	0.85	1.5	147	234	238	64	93	93	93	3	
1b	49.0	1838	705.6	0.90	1.6	157	235	234	65	93	93	93	3	
2a	52.5	1836	708.1	0.88	1.6	157	235	233	65	94	94	94	3	
1b	56.0	1840	710.8	0.88	1.6	157	232	234	65	93	93	93	3	
3A	59.5	1843	713.0	0.88	1.6	157	232	234	66	94	94	94	3	
1b	63.0	1845	715.3	0.85	1.5	156	232	237	66	94	94	94	3	
1a	66.5	1851	718.1	0.14	2.5	149	233	236	63	93	93	93	3	
1b	70.0	1854	721.6	1.4	2.5	152	233	233	63	94	94	94	3	
2a	73.5	1857	724.4	1.4	2.5	149	234	235	56	94	94	94	3	
1b	77.0	1902	727.5	1.3	2.4	149	234	239	55	94	94	94	4	
3a	80.5	1905	730.5	1.3	2.4	149	234	236	55	94	94	94	4	
1b	84.0	1909	733.7	1.3	2.3	148	236	230	55	94	94	94	4	

ΔV_m = $\sqrt{\Delta p}$ ΔH = $\frac{\Delta H}{T_s}$ T_m = $\frac{T_m}{T_s}$

FIELD DATA SHEET

Plant: AK Dearborn Sample Type: Metals Operator: MK/NPT/JG
 Sampling Location: CFI Inlet B17 P_{bar}: 29.65 P_S: 0.5 O₂: 20.0
 Run Number: B-254 Date: 8/3/20 CO₂: 6.61 Pitot#: 6-10
 Pretest Leak Rate: ___ cfm @ ___ in.Hg. Probe Length/Type: 6' GA Pitot#: 6-10
 Pretest Leak Check: Pitot: Orsat: — Stack Diameter: 152" K: ___

Nozzle ID: 0210 Thermocouple #: 6-10
 Assumed B_{WS}: 2 Filter #: ___
 Meter Box #: 11 Y: 6.023 ΔH@: 1.767
 Post-Test Leak Rate: 0.00 cfm @ 7 in.Hg.
 Post-Test Leak Check: Pitot: Orsat: —

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (T _s)	Temperature of		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg.)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
	84.0	1909	733.7	1.3	2.3	2.3	148	232	234	56		94	92	4
1a	87.5	1912	736.4	1.3	2.3	2.3	150	233	230	55		94	92	4
b	91.0	1916	739.5	1.4	2.4	2.4	151	233	239	56		94	92	4
2a	94.5	1920	742.6	1.4	2.4	2.4	151	234	236	56		94	92	4
b	98.0	1923	745.0	1.5	2.7	2.7	150	234	233	57		94	92	4
3a	101.5	1926	748.7	1.4	2.5	2.5	150	234	235	58		94	92	4
b	105	1930	751.855	1.5	2.7	2.7	150	231	230	59		94	92	4
1a	108.5	1933	755.0	1.5	2.7	2.7	152	232	235	62		94	92	4
b	112.0	End												
2a	115.5													
b	119.0													
3a	122.5													
b														
1939	111.50		757.732	1.5										

$\Delta V_m = 87,004 \sqrt{\Delta p} = 1,0482 \sqrt{\Delta H} = 2.077 T_s = 151$
 $1,1163$

$T_m = 92$

605

SAMPLE RECOVERY DATA

Plant AK DEARBORN Run No. B-29-4
 Date 8/13/20 Sample Box No. _____ Job No. 050074.0221
 Sample Location C FURNACE BH Filter No. 276084
 Train Preparer CJ Sample Head No. 13
 Sample Recovery Person CJ Barometer No. _____
 Comments _____ Balance No. 4

Front Half

Acetone B-29-4 Liquid _____
 Container No. FK ACC Level Marked Sealed

Filter

Container No. 276084 Sealed

Description of Filter minimal loady

Samples Stored and Locked

Back Half/Moisture

Container No. B-29-24 51/101 / MH

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	5% HNO ₃ / 10% H ₂ O ₂	100	764.3	766.3	2.0
2	5% HNO ₃ / 10% H ₂ O ₂	100	747.8	753.2	5.4
3	—	—	652.8	654.6	1.8
4	SG	250	1003.3	1016.0	12.7
5					
6					
Total					24.9

✓CS

Description of Impinger Catch: clear

FIELD DATA SHEET

Nozzle ID: 0.219 Thermocouple #: T6-15
 Assumed Bws: 2 Filter #: 833254
 Meter Box #: 6 Y: 0.916 ΔH@: 1.932
 Post-Test Leak Rate: ∞ cfm @ ∞ in.Hg.
 Post-Test Leak Check: Pitot: ✓ Orsat: -

Sample Type: 15/200 Operator: FEZ
 P_{bar}: 2165 P_s: -0.60
 CO₂: 0.2
 Probe Length/Type: 6'GL Pitot#: T6-15
 Stack Diameter: 152" K: 2.171

Plant: AK Dearborn Sample Type: 15/200 Operator: FEZ
 Sampling Location: C-Furnace Prophase
 Run Number: B-202-1 Date: 8/12/20
 Pretest Leak Rate: 0.00 cfm @ 12 in.Hg.
 Pretest Leak Check: Pitot: ✓ Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature of F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
0	0	0651	263.982	0.70	1.3	1.3	156	243	240	64	65	81	80	2
1a	4	0655	266.5	0.67	1.3	1.3	116	239	241	64	66	66	65	2
b	8	0659	268.7	0.72	1.4	1.4	113	237	240	64	67	66	65	2
2a	12	0703	271.4	0.90	1.8	1.8	117	238	240	65	65	67	66	4
b	16	0707	274.2	0.90	1.8	1.8	120	239	240	63	65	68	66	4
3a	20	0711	277.2	0.95	1.9	1.9	124	240	240	62	65	69	66	4
b	24	0715	280.285	0.95	1.9	1.9	124	240	241	60	68	68	67	4
1a	28	0726	283.3	0.95	1.8	1.8	130	245	240	59	69	69	67	4
b	32	0730	286.3	0.95	1.8	1.8	131	243	240	57	67	70	67	4
2a	36	0734	289.2	0.95	1.7	1.7	132	245	240	57	66	70	68	4
b	40	0738	292.1	0.90	1.6	1.6	134	252	240	57	68	71	68	4
3a	44	0742	294.9	0.85	1.7	1.7	136	250	240	57	65	71	68	4
b	48	0746	297.737	0.88	1.8	1.8	135	241	246	57	67	70	69	4
1a	52	0754	300.6	0.95	1.8	1.8	140	230	240	58	65	71	69	4
b	56	0758	303.6	0.95	1.8	1.8	142	231	245	58	68	72	69	4
2a	60	0802	306.5	0.95	1.8	1.8	144	238	246	60	67	72	69	4
b	64	0806	309.4	0.95	1.8	1.8	146	240	246	61	66	73	70	4
3a	68	0810	312.3	0.95	1.7	1.7	150	239	241	60	69	73	70	4
b	72	0814	315.214	0.92	1.8	1.8	146	252	246	65	67	71	70	4
1a	76	0818	318.17	0.95	1.8	1.8	146	252	246	65	67	71	70	4
b	80	0822												
2a	84	0826												
b	88	0830												
3a	92	0834												
b	96	0838												

raise port change

Restack 0722

raise port change

Restack 0732

raise port change

Restack 0814

✓

T_m = 68.69

ΔV_m = 52.007 $\sqrt{\Delta p} = 0.9429$ $\overline{\Delta H} = 1.71$ $T_s = 133$

52.807 $\overline{\Delta p} = 0.89$

SAMPLE RECOVERY DATA

Plant AK DEARBORN Run No. B-202-1
 Date 8/13/20 Sample Box No. 45B-2 Job No. 050074.0221
 Sample Location C FURNACE BH Filter No. 833259
 Train Preparer EZ Sample Head No. SH-23
 Sample Recovery Person CJ Barometer No. TUC
 Comments M5/202 Balance No. 4

Front Half

Acetone B-202-1 Liquid
 Container No. FR ACE Level Marked Sealed

Filter
 Container No. 833259 Sealed

Description of Filter no load

Samples Stored and Locked

Back Half/Moisture

Container No. B-202-1 BH H₂O / ACE/H₂O

Liquid Level Marked Sealed

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	—	—	498.8	606.1	107.3
2	—	—	657.8	657.9	0.1
3	H ₂ O	100	780.9	777.7	-3.2
4	Silica Gel	250g	889.1	902.9	13.8
5					
6				-100	-100
Total					18.0

100 -
H₂O

105

Description of Impinger Catch: clear

FIELD DATA SHEET

Plant: AK Dechloro
 Sampling Location: C-Furnace Baghouse
 Run Number: B-202-2 Date: 8/13/20
 Pretest Leak Rate: 0.29 cfm @ 12 in.Hg.
 Pretest Leak Check: Pitot: √ Orsat: -

Sample Type: M5/200 Operator: EZ
 P_{bar}: 29.65 P_s: -0.90
 CO₂: 0.00 O₂: 0.00
 Probe Length/Type: 6'6" Pitot#: 16-15
 Stack Diameter: 152" K: 2.171

Nozzle ID: 0.210 Thermocouple #: 16-15
 Assumed Bws: 2 Filter #: 833260
 Meter Box #: 6 Y: 2.916 ΔH@: 1.132
 Post-Test Leak Rate: 0.29 cfm @ 8 in.Hg.
 Post-Test Leak Check: Pitot: √ Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
0	0	1037	316.047	1.5	2.8	2.8	156	252	240	65	80	74	74	5
1a	4	1041	349.6	1.6	3.1	3.1	138	244	241	65	72	75	75	6
2a	8	1045	323.3	1.0	1.9	1.9	141	244	240	64	68	76	75	04
b	12	1049	326.3	1.0	1.9	1.9	144	248	240	66	66	76	75	4
3a	16	1053	329.2	1.1	2.1	2.1	145	249	240	66	68	76	75	4
b	20	1057	332.3	1.1	2.1	2.1	146	249	241	66	67	78	76	4
1a	24	1101	335.47	1.9	3.7	3.7	141	247	237	65	73	77	76	7
b	28	1113	339.3	1.9	3.7	3.7	143	233	242	65	70	79	77	7
2a	32	1117	343.5	1.9	3.7	3.7	143	235	240	67	70	80	77	7
b	36	1121	347.6	2.0	3.9	3.9	145	232	241	68	70	80	77	7
3a	40	1125	351.8	2.0	3.9	3.9	145	232	241	68	70	81	78	7
b	44	1129	356.0	2.0	3.9	3.9	145	236	241	68	70	81	78	7
1a	48	1133	360.335	2.0	3.9	3.9	145	234	238	67	70	81	78	7
b	52	1138	364.5	2.0	3.9	3.9	145	241	243	65	76	80	79	7
2a	56	1142	368.8	1.9	3.7	3.7	147	238	239	58	68	81	79	7
b	60	1146	373.1	2.0	3.9	3.9	149	255	240	57	68	82	79	7
3a	64	1150	377.3	2.0	3.9	3.9	151	252	240	56	68	82	80	7
b	68	1154	381.7	2.0	3.9	3.9	152	245	240	58	68	83	80	7
1a	72	1158	385.886	2.0	3.9	3.9	152	245	240	55	69	83	80	7
b	76	1205	340.0	1.9	3.7	3.7	147	237	240	62	75	82	81	7
2a	80	1209	344.2	1.9	3.7	3.7	156	243	240	55	72	83	81	7
b	84	1213	348.4	2.0	3.8	3.8	156	252	240	56	73	83	81	7
3a	88	1217	402.6	1.9	3.6	3.6	156	252	240	56	73	83	81	7
b	92	1223	406.8	1.9	3.6	3.6	160	255	240	57	73	84	81	7
1a	96	1229	410.827	1.9	3.6	3.6	160	258	237	58	74	85	81	7

gauge port change
 Restart
 1109

gauge port change
 Restart
 1134

gauge port change
 Restart
 1201

gauge port change
 Restart
 1211

$\Delta V_m = 94.780$ $\sqrt{\Delta P} = 1.3217$ $\Delta H = 3.41$ $T_s = 148$

$\Delta P = 1.7667$

$T_m = 71$

101

SAMPLE RECOVERY DATA

Plant AK Barbours Run No. B-202-2
 Date 8/1/2020 Sample Box No. _____ Job No. 050074.0221
 Sample Location Cfence Baghouse Filter No. 833260
 Train Preparer RK Sample Head No. SH-18
 Sample Recovery Person _____ Barometer No. 8
 Comments M5/202 train Balance No. 8

Front Half

Acetone B-202-2 Liquid _____
 Container No. EH ACE Level Marked _____ Sealed _____
~~actual~~

Filter _____
 Container No. 833260 Sealed _____

Description of Filter minimal loading

Samples Stored and Locked _____

Back Half/Moisture

Container No. B-202-2 BH H₂O / Acc/MEX

Liquid Level Marked _____ Sealed _____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	—	—	488.9	589.6	100.7
2	—	—	678.8	678.9	0.1
3	H ₂ O	100	773.7	773.5	-0.2
4	SA	250	966.2	992.1	25.9
5					
6					
Total					26.5

+ 100 cc
H₂O
✓

Description of Impinger Catch: clear

FIELD DATA SHEET

Nozzle ID: 020 Thermocouple #: 16-15
 Assumed Bws: 2 Filter #: 833287
 Meter Box #: 6 Y: 0916 ΔH@: 1.932
 Post-Test Leak Rate: 0.00 cfm @ 9 in.Hg.
 Post-Test Leak Check: Pitot: ✓ Orsat: -

Sample Type: 15/202 Operator: FE
 P_{bar}: 29.65 P_s: -0.83
 CO₂: can O₂: can
 Probe Length/Type: 6'6" Pitot#: 16-15
 Stack Diameter: 15.2" K: 2.17

Plant: AK Daborn Sample Type: 15/202 Operator: FE
 Sampling Location: C-Furcace Baghouse
 Run Number: B-202-3 Date: 8/13/20
 Pretest Leak Rate: 0.00 cfm @ 10 in.Hg.
 Pretest Leak Check: Pitot: ✓ Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
0	0	1513	411.482											
1a	135	1517	414.0	1.3	2.5	2.5	148	249	239	65	84	81	81	5
b	87	1520	417.8	1.3	2.5	2.5	142	251	241	68	78	81	81	5
2a	1205	1524	420.1	0.87	1.7	1.7	144	246	240	67	75	80	81	3
b	1614	1527	422.6	0.84	1.6	1.6	146	253	241	68	74	81	81	3
3a	2017.5	1531	425.5	1.2	2.3	2.3	145	249	239	66	71	82	80	4
b	2421	1534	428.547	1.3	2.5	2.5	144	248	238	65	69	82	81	5
1a	2824.5	1541	431.8	1.6	3.1	3.1	144	251	240	65	68	82	81	6
b	3228	1545	435.1	1.6	3.1	3.1	144	250	240	59	68	82	81	6
2a	3631.5	1548	438.5	1.6	3.1	3.1	144	250	240	58	70	83	81	6
b	4035	1552	441.8	1.6	3.1	3.1	142	248	240	57	69	83	81	6
3a	4438.5	1555	443.2	1.7	3.3	3.3	142	251	240	56	68	83	81	7
b	4842	1559	448.817	1.7	3.3	3.3	142	252	240	56	67	84	81	7
1a	5245.5	1605	452.2	1.7	3.3	3.3	141	248	239	56	70	84	82	7
b	5649	1609	455.6	1.7	3.3	3.3	141	248	240	55	67	84	82	7
2a	6052.5	1612	459.1	1.7	3.3	3.3	142	251	240	54	66	84	82	7
b	6456	1616	462.6	1.7	3.3	3.3	142	249	240	54	67	84	82	7
3a	6859.5	1619	465.9	1.7	3.3	3.3	143	249	240	54	66	85	82	7
b	7263	1623	469.582	1.8	3.5	3.5	144	251	240	54	67	85	83	7
1a	7666.5	1628	473.2	1.8	3.5	3.5	143	250	241	60	68	85	83	7
b	8070	1632	476.7	1.8	3.5	3.5	143	251	241	56	69	85	83	7
2a	8473.5	1635	480.1	1.6	3.1	3.1	144	247	238	58	70	85	83	7
b	8877	1639	483.5	1.7	3.3	3.3	145	250	242	60	71	85	83	7
3a	9280.5	1642	487.0	1.7	3.3	3.3	143	245	235	61	72	86	84	7
b	9684	1646	490.3	1.5	2.9	2.9	144	248	236	62	73	86	84	6

$\Delta V_m = \sqrt{\Delta p}$ $\Delta H =$ $T_s =$ $T_m =$

FIELD DATA SHEET

Plant: AK Dearborn Sample Type: MSR2 Operator: EZ Nozzle ID: 0.210 Thermocouple #: 76-15
 Sampling Location: C Furnace Bypass P_{bar}: 29.645 P_s: 0.83 Assumed Bws: 2 Filter #: 933287
 Run Number: B-202-3 Date: 8/13/20 CO₂: 0.00 O₂: 0.00 Meter Box #: 6 Y: 0.000 ΔH@: 1.932
 Pretest Leak Rate: 0.00 cfm @ 9 in.Hg. Probe Length/Type: 6'6.1 Pitot#: 7675 Post-Test Leak Rate: 0.00 cfm @ 9 in.Hg.
 Post-Test Leak Check: Pitot: 1.52" K: 2.171 Stack Diameter: 15.2" Orsat: na

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature °F		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
19	87.5	1649	493.7	1.7	3.3	3.3	144	240	242	60	73	86	84	7
29	91	1653	497.2	1.7	3.3	3.3	144	250	239	64	73	87	84	7
29	94.5	1656	509.5	1.7	3.3	3.3	144	250	240	65	73	87	84	7
39	98	1709	504.5	1.7	3.3	3.3	145	252	240	65	72	87	84	7
39	101.5	1703	507.3	1.4	2.7	2.7	145	250	240	66	72	87	84	8
39	105	1707	510.574	1.4	2.7	2.7	144	247	239	67	73	87	84	8
19	108.5	1713	514.0	1.7	3.3	3.3	144	256	245	68	77	86	85	7
29	112	1716	517.4	1.7	3.3	3.3	146	248	240	67	77	88	85	7
29	115.5	1720	520.8	1.7	3.3	3.3	146	247	239	67	72	87	85	7
39	119	1723	524.3	1.7	3.3	3.3	150	250	241	68	70	87	85	7
39	120.5	1725	525.823	1.7	3.3	3.3	150	249	240	68	68	87	85	7
End of Run														

$\Delta V_m = 114.341 \sqrt{\Delta p} = 1.2507$ $\Delta H = 3.05$ $T_s = 144$ $T_m = 84$
 $\Delta P = 1.5746$

60

SAMPLE RECOVERY DATA

Plant AK DEARBORN Run No. B-202-3
 Date 8/13/20 Sample Box No. _____ Job No. 050074-0221
 Sample Location C FURNACE BH Filter No. 833287
 Train Preparer CT Sample Head No. 8
 Sample Recovery Person CT Barometer No. _____
 Comments _____ Balance No. 4

Front Half

Acetone B-2023 Liquid _____
 Container No. FK ACE Level Marked _____ Sealed _____

Filter _____
 Container No. 833287 Sealed _____

Description of Filter minimal loading

Samples Stored and Locked

Back Half/Moisture

Container No. B-202-3 BACK 1/2 H₂O / ACE/HEX

Liquid Level Marked _____ Sealed _____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	—	—	499.0	605.0	6.0
2	—	—	658.4	658.3	-0.1
3	H ₂ O	100	777.7	772.5	-5.2
4	SG	250	902.9	924.8	21.9
5					
6					
Total					22.6

+100 ml
H₂O

103

Description of Impinger Catch: clear

FIELD DATA SHEET

Page 1

Plant: AK Dearborn Sample Type: 15/202 Operator: FZ
 Sampling Location: C. Furnace Bypass P_{bar}: 29.65 P_s: 0.56
 Run Number: B-22-4 Date: 8/13/20 CO₂:
 Pretest Leak Rate: 0.223 cfm @ 11 in.Hg. Probe Length/Type: 6'6L Pitot#: T6-15
 Pretest Leak Check: Pitot: √± Orsat: - Stack Diameter: 15.2" K: 2.171

Nozzle ID: 0.210 Thermocouple #: T6-15
 Assumed B_{ws}: 2 Filter #: 833258
 Meter Box #: 6 Y: 2996 ΔH@: 1.932
 Post-Test Leak Rate: 0.09 cfm @ 9 in.Hg.
 Post-Test Leak Check: Pitot: √± Orsat: -

Traverse Point Number	Sampling Time	Clock Time	Gas Meter Reading	Velocity Head	ΔH		Stack Temp (Ts)	Temperature of Probe		Impinger Temp. °F	Aux. Temp.	Dry Gas Meter Temp.		Pump Vacuum (in. Hg)
					Desired	Actual		Probe	Filter			Inlet	Outlet	
0	0	1738	526.184											
1a	1735	1741	529.4	1.2	2.4	2.4	142	231	240	65	80	87	86	8
b	1737	1745	531.8	0.85	1.7	1.7	143	252	241	67	83	88	86	8
2a	1740	1748	534.3	0.87	1.7	1.7	147	246	241	66	78	88	86	6
b	1744	1752	536.7	0.86	1.7	1.7	149	241	240	65	80	88	86	6
3a	1745	1755	531.2	0.86	1.7	1.7	152	246	237	65	80	89	87	6
change	2421	1779	541.268	0.86	1.7	1.7	153	257	242	64	72	89	87	6
Restart 1802	1805	1805	544.1	0.83	1.6	1.6	154	249	238	68	73	89	87	6
b	1808	1809	546.7	0.86	1.7	1.7	155	248	240	61	69	90	88	6
2a	1815	1812	549.3	0.87	1.7	1.7	155	250	240	59	68	90	88	6
b	1818	1816	551.8	0.83	1.6	1.6	155	253	240	58	67	90	88	6
3a	1825	1819	554.2	0.82	1.6	1.6	155	247	240	57	67	91	88	6
change	1822	1823	556.755	0.82	1.6	1.6	155	254	240	58	67	91	89	6
Restart 1825	1828	1828	559.2	0.83	1.6	1.6	155	252	240	58	68	91	88	6
b	1832	1832	561.7	0.86	1.7	1.7	155	258	240	59	70	91	89	6
2a	1835	1835	564.2	0.86	1.7	1.7	155	257	238	58	69	91	89	6
b	1839	1839	566.6	0.79	1.5	1.5	156	252	240	58	69	91	89	6
3a	1842	1842	569.0	0.79	1.5	1.5	156	243	240	58	69	91	89	6
change	1846	1846	571.359	0.72	1.4	1.4	156	244	244	59	70	91	89	5
Restart 1848	1851	1851	574.4	1.3	2.5	2.5	155	247	240	61	71	91	89	8
b	1855	1855	577.5	1.3	2.5	2.5	150	244	239	57	71	92	90	8
2a	1858	1858	580.6	1.2	2.4	2.4	149	248	244	57	68	92	90	8
b	1902	1902	583.4	1.2	2.4	2.4	149	252	240	58	67	92	90	8
3a	1905	1905	586.4	1.1	2.2	2.2	150	254	240	59	65	92	90	8
b	1909	1909	589.4	1.1	2.2	2.2	150	245	241	58	66	92	90	8

$\Delta V_m = \sqrt{\Delta p}$ $\Delta H =$ $T_s =$ $T_m =$

SAMPLE RECOVERY DATA

Plant AK DEARBOR Run No. B-202-4
 Date 8/13/20 Sample Box No. _____ Job No. 050074.0221
 Sample Location C FURNACE BH Filter No. 833258
 Train Preparer CT Sample Head No. 18
 Sample Recovery Person ej Barometer No. _____
 Comments _____ Balance No. 4

Front Half

Acetone B-202-4 Liquid _____
 Container No. PH AC Level Marked _____ Sealed _____

Filter

Container No. 833258 Sealed _____

Description of Filter minimal loading

Samples Stored and Locked _____

Back Half/Moisture

Container No. B-202-4 Back 1/2 H₂O / Acetone / Hexane

Liquid Level Marked _____ Sealed _____

Imp. No.	Contents	Initial Vol (ml)	Weight (grams)		
			Initial	Final	Net
1	—	—	486.3	590.8	104.5
2	—	—	666.8	666.8	0.0
3	H ₂ O	100	803.8	796.2	-7.6
4	SG	250	934.8	962.9	27.9 ^{net}
5					
6					
Total					-100 25.0

+100 net
H₂O

✓ OS

Description of Impinger Catch: clear



CEM CALIBRATION DATA SHEET

Operator: Chris Junzo
Date: 8/13/20

Company: AK DENBORN
Location: C FURNACE BAGHOUSE
Project No.: 050074-0221

1036 - 1226

Pollutant/ Range/ Inst. ID	Cal Gas	Cal Gas Conc.	Calibration Response		Post Test Run 1 2			Post Test Run 3			Post Test Run 4			Cylinder No.	
			Direct Time:	System	ppm/% Time:	%Drift	%Bias	ppm/% Time:	%Drift	%Bias	ppm/% Time:	%Drift	%Bias		
O ₂	Zero	0	-0.050	0.096	0.088	0.001	-0.042								
	Low														
	Mid	11.0	10.958	11.076											
	High	22.0	22.031	21.984	22.024	21.983	21.957								CC123685
CO ₂	Zero	0	0.059	0.143	0.156	0.079	0.066								CC200755
	Low														
	Mid	11.0	11.097	10.963	11.070	11.026	10.982								CC700755
	High	22.0	22.057	21.781											CC123685
CO	Zero	0	0.13	0.46	0.83	1.19	1.14								
	Low														
	Mid	90.1	90.58	90.34	90.02	89.56	89.54								CC86523
	High	191	191.19	187.85											SA5340
NO _x	Zero	0	-0.01	-0.01	-0.01	-0.01	0.03								
	Low	49.2 NO ₂	48.62					46.03							CC441000
	Mid	46.0	46.67	46.14	46.16	46.17	47.37	47							DT0027906
	High	91.2	91.34	90.38	90.38	90.38	90.38	90.38							SA5083
THC	Zero	0	-	0.73	0.09	0.06	-0.39								
	Low	27.4	-	26.90											CC118308
	Mid	46.65	-	47.11	46.70	46.66	47.37								CC469668
	High	85.5	-	86.03											ALM088165
Averages		New Analyzer		O ₂	20.67	20.691	20.638								
		0	-0.05	CO ₂	0.15036	0.275	0.320								
		27.4	27.91	CO	52.72618	19.86	17.45								
		46.5	46.35	NO _x	1.11	0.91	0.70								
	85.5	85.52	THC	49.18	25.86	23.73									

* USE NEW THC ANALYZER AFTER RUN 1 → Calibration would not come in → High VOC background

CEM CALIBRATION DATA

Plant Name
 Sampling Location
 Date
 Run Number
 Start Time
 Stop Time

AK Dearborn
 C Furnace Baghouse
 8/13/2020
 1
 0651
 0815

Plant Rep.
 Team Leader
 CEM Operator
 Project Number

David Pate
 Ron Kolde
 Chris Janzen
 50074.0221

Analyzer Number
 Analyzer Span

CO
 CO2
 O2
 THC
 NOX

191
 22
 22
 100
 91.2

Calibration Gas % of Span	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK				Calibration Correction Factors	
	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Calibration Error (% of Span)	PRETEST		POST TEST			
					System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)		Drift (% of Span)
O2 Zero	0%	0	-0.05	-0.2	0.096	0.7	0.088	0.6	0.0	Co=0.09
O2 Mid	100%	11 CC123685	10.958	-0.2						
O2 High	100%	22 CC700755	22.031	0.1	21.984	-0.2	22.024	0.0	0.2	Cm=22.00
CO2 Zero	0%	0	0.059	0.3	0.143	0.4	0.156	0.4	0.1	Co=0.1
CO2 Mid	50%	11 CC700755	11.097	0.4	10.963	-0.6	11.07	-0.1	0.5	Cm=11.0
CO2 High	100%	22 CC123685	22.057	0.3						
CO Zero	0%	0	0.13	0.1	0.46	0.2	0.83	0.4	0.2	Co=0.6
CO Mid	47%	90.1 CC86523	90.58	0.3	90.34	-0.1	90.02	-0.3	0.2	Cm=90.2
CO High	100%	191 SA5340	191.19	0.1						
THC Zero	0%	0	0.73				Too High			
THC Low	27%	27.4 CC118308	26.9							
THC Mid	47%	46.65 CC469668	47.11	1.0			Too High			
THC High	86%	85.5 ALM058115	86.03							
NOx Zero	0	0	-0.01	0.0	-0.01	0.0	-0.01	0.0	0.0	Co=0.0
NOx Mid	50%	46 DT0027866	46.67	0.7	46.14	-0.6	46.16	-0.6	0.0	Cm=46.2
NOx High	100%	91.2 SA5083	91.34	0.2						

CEM CALIBRATION DATA

Plant Name
 Sampling Location
 Date
 Run Number
 Start Time
 Stop Time

AK Dearborn
C Furnace Baghouse
08/13/20
2
1036
1226

Plant Rep.
 Team Leader
 CEM Operator
 Project Number

David Pate
Ron Kolde
Chris Janzen
50074.0221

Analyzer Number	Analyzer Span
CO	191
CO2	22
O2	22
THC	100
NOx	91.2
SO2	

Calibration Gas	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK				Calibration Correction Factors		
	% of Span	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Calibration Error (% of Span)	PRETEST System Response	Syst. Bias (% of Span)	POST TEST System Response		Syst. Bias (% of Span)	Drift (% of Span)
O2 Zero	0%	0		-0.05	-0.2	0.088	0.6	0.001	0.2	-0.4	Co=0.0
O2 Mid	100%	11	CC123685	10.958	-0.2						
O2 High	100%	22	CC700755	22.031	0.1	22.024	0.0	21.983	-0.2	-0.2	Cm=22.0
CO2 Zero	0%	0		0.059	0.3	0.156	0.4	0.079	0.1	-0.4	Co=0.1
CO2 Mid	50%	11	CC700755	11.097	0.4	11.07	-0.1	11.026	-0.3	-0.2	Cm=11.0
CO2 High	100%	22	CC123685	22.057	0.3						
CO Zero	0%	0		0.13	0.1	0.83	0.4	1.19	0.6	0.2	Co=1.0
CO Mid	47%	90.1	CC86523	90.58	0.3	90.02	-0.3	89.56	-0.5	-0.2	Cm=89.8
CO High	100%	191	SA5340	191.19	0.1						
THC Zero	0%	0		-0.05		0.09		0.06		0.0	
THC Low	27%	27.3		27.91							
THC Mid	47%	46.65	CC469668	46.35	-0.6	46.7		46.66		0.0	
THC High	86%	85.5	ALM058115	85.52							
NOx Zero	0	0		-0.01	0.0	-0.01	0.0	-0.01	0.0	0.0	Co=0.0
NOx Mid	50%	46	DT0027866	46.67	0.7	46.16	-0.6	46.17	-0.5	0.0	Cm=46.2
NOx High	100%	91.2	SA5083	91.34	0.2						

CEM CALIBRATION DATA

Plant Name
 Sampling Location
 Date
 Run Number
 Start Time
 Stop Time

AK Dearborn
 C Furnace Baghouse
 08/13/20
 3
 1513
 1725

Plant Rep.
 Team Leader
 CEM Operator
 Project Number

David Pate
 Ron Kolde
 Chris Janzen
 50074.0221

Analyzer Number	Analyzer Span
CO	191
CO2	22
O2	22
THC	100
NOx	91.2
SO2	

CALIBRATION ERROR CHECK			SYSTEM CAL CHECK				Calibration Correction Factors			
Calibration Gas % of Span	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	PRETEST		POST TEST		Drift (% of Span)		
				Calibration Error (% of Span)	System Response	Syst. Bias (% of Span)	System Response		Syst. Bias (% of Span)	
O2 Zero	0%	0	-0.05	-0.2	0.001	0.2	-0.042	0.0	-0.2	Co=0.0
O2 Mid	100%	11 CC123685	10.958	-0.2						
O2 High	100%	22 CC700755	22.031	0.1	21.983	-0.2	21.957	-0.3	-0.1	Cm=22.0
CO2 Zero	0%	0	0.059	0.3	0.079	0.1	0.066	0.0	-0.1	Co=0.1
CO2 Mid	50%	11 CC700755	11.097	0.4	11.026	-0.3	10.982	-0.5	-0.2	Cm=11.0
CO2 High	100%	22 CC123685	22.057	0.3						
CO Zero	0%	0	0.13	0.1	1.19	0.6	1.14	0.5	0.0	Co=1.2
CO Mid	47%	90.1 CC86523	90.58	0.3	89.56	-0.5	89.54	-0.5	0.0	Cm=89.6
CO High	100%	191 SA5340	191.19	0.1						
THC Zero	0%	0	-0.05		0.06		-0.39		-0.5	
THC Low	27%	27.3	27.62							
THC Mid	47%	46.65 CC469668	46.35	-0.6	46.66		47.37		0.7	
THC High	86%	85.5 ALM058115	85.52							
NOx Zero	0	0	-0.01	0.0	-0.01	0.0	0.03	0.0	0.0	Co=0.0
NOx Mid	50%	46 DT0027866	46.67	0.7	46.17	-0.5	45.03	-1.8	-1.3	Cm=45.6
NOx High	100%	91.2 SA5083	91.34	0.2						

CEM CALIBRATION DATA

Plant Name
 Sampling Location
 Date
 Run Number
 Start Time
 Stop Time

AK Dearborn
 C Furnace Baghouse
 08/13/20
 4
 1738
 1938

Plant Rep.
 Team Leader
 CEM Operator
 Project Number

David Pate
 Ron Kolde
 Chris Janzen
 50074.0221

Analyzer	Analyzer Span
CO	191
CO2	22
O2	22
THC	100
NOx	91.2
SO2	

Calibration Gas % of Span	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK				Calibration Correction Factors	
	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Calibration Error (% of Span)	PRETEST System Response	Syst. Bias (% of Span)	POST TEST System Response	Syst. Bias (% of Span)		Drift (% of Span)
O2 Zero	0%	0	-0.05	-0.2	-0.042	0.0	-0.156	-0.5	-0.5	-Co=0.1
O2 Mid	100%	11	10.958	-0.2						
O2 High	100%	22	22.031	0.1	21.957	-0.3	21.989	-0.2	0.1	Cm=22.0
CO2 Zero	0%	0	0.059	0.3	0.066	0.0	-0.071	-0.6	-0.6	Co=0.0
CO2 Mid	50%	11	11.097	0.4	10.982	-0.5	10.974	-0.6	0.0	Cm=11.0
CO2 High	100%	22	22.057	0.3						
CO Zero	0%	0	0.13	0.1	1.14	0.5	-0.59	-0.4	-0.9	Co=0.3
CO Mid	47%	90.1	90.58	0.3	89.54	-0.5	89.72	-0.5	0.1	Cm=89.6
CO High	100%	191	191.19	0.1						
THC Zero	0%	0	-0.05		-0.39		-0.49		-0.1	
THC Low	27%	27.3	27.62							
THC Mid	47%	46.65	46.35	-0.6	47.37		46.64		-0.7	
THC High	86%	85.5	85.52							
NOx Zero	0	0	-0.01	0.0	0.03	0.0	0.04	0.1	0.0	Co=0.0
NOx Mid	50%	46	46.67	0.7	45.03	-1.8	46.2	-0.5	1.3	Cm=45.6
NOx High	100%	91.2	91.34	0.2						

CEM Data

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Project Number:	50074.0221
CEM Operator:	Chris Janzen

Run 1		O2	CO2	CO	TGO	NOx
Date	Time	%	%	ppm	ppm	ppm
8/13/2020	6:52:41 AM	21.29244	3.75803	7.0569	7.9076	0.092
8/13/2020	6:53:41 AM	20.83064	0.25158	33.432	6.8747	0.1267
8/13/2020	6:54:41 AM	20.78297	0.22964	24.609	5.4453	0.1186
8/13/2020	6:55:41 AM	20.75706	0.23049	19.037	5.6905	0.1178
8/13/2020	6:56:41 AM	20.75351	0.24009	19.045	12.117	0.1235
8/13/2020	6:57:41 AM	20.75492	0.24237	20.222	18.729	0.1219
8/13/2020	6:58:41 AM	20.74924	0.22525	21.138	17.665	0.1168
8/13/2020	6:59:41 AM	20.74502	0.22699	21.341	18.381	0.118
8/13/2020	7:00:41 AM	20.73913	0.2225	29.907	18.496	0.1178
8/13/2020	7:01:41 AM	20.73949	0.23122	38.184	19.787	0.125
8/13/2020	7:02:41 AM	20.71305	0.2701	33.56	19.02	0.3629
8/13/2020	7:03:41 AM	20.6943	0.26627	41.119	21.475	0.5264
8/13/2020	7:04:41 AM	20.6893	0.25172	33.283	21.886	0.5029
8/13/2020	7:05:41 AM	20.66088	0.27798	26.698	21.934	0.6306
8/13/2020	7:06:41 AM	20.64576	0.29097	29.012	22.122	0.6586
8/13/2020	7:07:41 AM	20.64157	0.28813	30.949	20.82	0.6713
8/13/2020	7:08:41 AM	20.65598	0.31843	30.32	25.285	0.5824
8/13/2020	7:09:41 AM	20.60643	0.31327	26.36	17.444	0.7502
8/13/2020	7:10:41 AM	20.60313	0.29213	23.919	15.111	0.7884
8/13/2020	7:11:41 AM	20.60036	0.30318	23.287	14.529	0.8176
8/13/2020	7:12:41 AM	20.59915	0.29815	21.695	12.744	0.8223
8/13/2020	7:13:41 AM	20.59784	0.29682	21.677	12.811	0.8541
8/13/2020	7:14:41 AM	20.59733	0.31278	19.77	12.006	0.8766
8/13/2020	7:15:41 AM	20.59489	0.30339	21.7	12.712	0.9325
8/13/2020	7:16:41 AM	20.61447	0.26884	19.875	13.083	0.841
8/13/2020	7:17:41 AM	20.64431	0.27506	22.257	11.781	0.7748
8/13/2020	7:18:41 AM	20.65034	0.28538	23.115	11.945	0.7487
8/13/2020	7:19:41 AM	20.65197	0.26661	22.075	11.653	0.7477
8/13/2020	7:20:41 AM	20.64654	0.27524	22.023	11.446	0.7524
8/13/2020	7:21:41 AM	20.61567	0.34601	23.458	32.827	0.8649
8/13/2020	7:22:41 AM	20.58458	0.31503	22.186	21.159	0.9141
8/13/2020	7:23:41 AM	20.58863	0.32478	19.93	24.511	0.9465
8/13/2020	7:24:41 AM	20.59115	0.32912	17.168	23.898	0.9382
8/13/2020	7:25:41 AM	20.58657	0.32605	16.093	22.034	0.9442
8/13/2020	7:26:41 AM	20.58748	0.32586	15.481	23.57	0.9567
8/13/2020	7:27:41 AM	20.59258	0.34763	16.824	25.605	0.9683
8/13/2020	7:28:41 AM	20.61571	0.33576	16.978	38.151	0.9827
8/13/2020	7:29:41 AM	20.62253	0.333	17.642	33.479	1.0656
8/13/2020	7:30:41 AM	20.60485	0.32492	16.157	22.992	1.0226
8/13/2020	7:31:41 AM	20.60797	0.32201	17.114	24.031	0.8987
8/13/2020	7:32:41 AM	20.60452	0.32804	17.621	23.595	0.9391
8/13/2020	7:33:41 AM	20.597	0.34754	17.855	25.626	1.1242
8/13/2020	7:34:41 AM	20.59291	0.32647	17.244	24.58	1.2185
8/13/2020	7:35:41 AM	20.61614	0.32175	16.811	30.411	1.0837
8/13/2020	7:36:41 AM	20.6199	0.32337	18.295	31.306	0.9687
8/13/2020	7:37:41 AM	20.60908	0.3323	21.45	32.342	1.0316
8/13/2020	7:38:41 AM	20.66631	0.39447	24.562	79.582	1.2451
8/13/2020	7:39:41 AM	20.69054	0.41569	24.852	88.051	1.2324
8/13/2020	7:40:41 AM	20.65997	0.37261	23.181	71.416	1.2725
8/13/2020	7:41:41 AM	20.66514	0.39096	24.218	75.045	1.3085
8/13/2020	7:42:41 AM	20.62972	0.3808	24.177	58.832	1.3227
8/13/2020	7:43:41 AM	20.64693	0.39339	24.757	71.035	1.357
8/13/2020	7:44:41 AM	20.6222	0.37255	25.415	53.421	1.3646
8/13/2020	7:45:41 AM	20.61482	0.38169	25.563	47.332	1.4603
8/13/2020	7:46:41 AM	20.64526	0.34656	24.831	58.015	1.4484
8/13/2020	7:47:41 AM	20.61055	0.3435	23.823	38.026	1.4425
8/13/2020	7:48:41 AM	20.62761	0.36876	23.221	52.903	1.4757
8/13/2020	7:49:41 AM	20.63513	0.37619	23.238	58.284	1.5095
8/13/2020	7:50:41 AM	20.64401	0.37946	23.478	64.659	1.4979
8/13/2020	7:51:41 AM	20.6267	0.38937	23.377	52.278	1.5259
8/13/2020	7:52:41 AM	20.61382	0.34493	22.797	34.101	1.5772
8/13/2020	7:53:41 AM	20.60252	0.33027	23.446	22.084	1.8424
8/13/2020	7:54:41 AM	20.61034	0.32472	22.451	19.34	1.6644
8/13/2020	7:55:41 AM	20.61253	0.32126	23.573	21.253	1.6044
8/13/2020	7:56:41 AM	20.61997	0.31943	21.539	21.59	1.566
8/13/2020	7:57:41 AM	20.67524	0.39238	23.969	65.494	1.6601
8/13/2020	7:58:41 AM	20.72357	0.4591	25.052	105.26	1.6436

8/13/2020	7:59:41 AM	20.76617	0.46176	24.848	107.5	1.6546
8/13/2020	8:00:41 AM	20.7618	0.46833	26.664	107.48	1.6094
8/13/2020	8:01:41 AM	20.70684	0.45396	27.716	101.72	1.563
8/13/2020	8:02:41 AM	20.69897	0.44886	27.485	99.79	1.5653
8/13/2020	8:03:41 AM	20.69158	0.45108	27.276	96.229	1.544
8/13/2020	8:04:41 AM	20.72676	0.45731	25.804	107.42	1.5555
8/13/2020	8:05:41 AM	20.73609	0.44238	25.477	105.6	1.6109
8/13/2020	8:06:41 AM	20.76187	0.46235	24.612	107.5	1.7305
8/13/2020	8:07:41 AM	20.74691	0.44873	26.113	107.5	1.8816
8/13/2020	8:08:41 AM	20.73543	0.46908	31.658	107.5	1.9473
8/13/2020	8:09:41 AM	20.73223	0.49209	36.06	107.5	1.8741
8/13/2020	8:10:41 AM	20.73146	0.45266	37.778	107.5	1.7987
8/13/2020	8:11:41 AM	20.72901	0.45303	35.725	107.5	1.7513
8/13/2020	8:12:41 AM	20.69674	0.46163	42.745	107.44	1.8149
8/13/2020	8:13:41 AM	20.6375	0.43478	46.384	90.666	1.8359
8/13/2020	8:14:41 AM	20.67016	0.46065	53.896	106.85	1.9369
8/13/2020	8:15:41 AM	20.6711	0.45394	52.709	101.69	1.9057
Average		20.67	0.39	25.11	45.67	1.10

CEM Data

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Project Number:	50074.0221
CEM Operator:	Chris Janzen

Run 2		O2	CO2	CO	TGO	NOx
Date	Time	%	%	ppm	ppm	ppm
8/13/2020	10:37:27 AM	20.81455	0.28004	11.914	51.118	0.1046
8/13/2020	10:38:27 AM	20.82646	0.23526	12.823	60.198	0.0397
8/13/2020	10:39:27 AM	20.78751	0.22368	28.003	78.896	0.0699
8/13/2020	10:40:27 AM	20.79637	0.23272	32.009	75.465	0.0657
8/13/2020	10:41:27 AM	20.76217	0.25025	31.798	74.616	0.0841
8/13/2020	10:42:27 AM	20.76155	0.24826	37.6	76.151	0.1055
8/13/2020	10:43:27 AM	20.74195	0.26115	42.925	69.815	0.202
8/13/2020	10:44:27 AM	20.69308	0.29304	45.965	98.489	0.7506
8/13/2020	10:45:27 AM	20.69126	0.27019	34.983	52.074	0.7206
8/13/2020	10:46:27 AM	20.68239	0.29355	22.182	70.434	0.7784
8/13/2020	10:47:27 AM	20.68635	0.29257	23.363	37.308	0.7989
8/13/2020	10:48:27 AM	20.6794	0.29105	15.913	25.9	0.8271
8/13/2020	10:49:27 AM	20.67324	0.30124	17.399	57.031	0.7967
8/13/2020	10:50:27 AM	20.67863	0.31355	22.369	30.041	0.7598
8/13/2020	10:51:27 AM	20.6655	0.31348	15.769	50.945	0.8414
8/13/2020	10:52:27 AM	20.67713	0.28333	22.984	31.786	0.7909
8/13/2020	10:53:27 AM	20.66469	0.30641	19.065	40.218	0.787
8/13/2020	10:54:27 AM	20.66996	0.29799	21.831	40.367	0.7095
8/13/2020	10:55:27 AM	20.67073	0.30018	23.539	39.027	0.6665
8/13/2020	10:56:27 AM	20.66901	0.31122	22.68	32.136	0.6759
8/13/2020	10:57:27 AM	20.67533	0.30725	21.914	28.777	0.7107
8/13/2020	10:58:27 AM	20.66661	0.29436	17.952	23.426	0.7583
8/13/2020	10:59:27 AM	20.66812	0.29707	19.84	23.234	0.7307
8/13/2020	11:00:27 AM	20.67873	0.29655	15.43	17.714	0.723
8/13/2020	11:01:27 AM	20.70444	0.28373	14.763	23.307	0.5256
8/13/2020	11:02:27 AM	20.70727	0.28132	17.244	44.252	0.566
8/13/2020	11:03:27 AM	20.7144	0.27902	19.33	36.732	0.577
8/13/2020	11:04:27 AM	20.70601	0.27927	15.438	20.648	0.5878
8/13/2020	11:05:27 AM	20.69951	0.23625	22.586	43.303	0.5412
8/13/2020	11:06:27 AM	20.69712	0.26509	22.558	24.56	0.5707
8/13/2020	11:07:27 AM	20.69512	0.27388	20.406	24.421	0.5812
8/13/2020	11:08:27 AM	20.69756	0.27097	21.995	21.576	0.5851
8/13/2020	11:09:27 AM	20.69481	0.27693	22.236	20.381	0.5971
8/13/2020	11:10:27 AM	20.69334	0.28982	21.709	17.228	0.5578
8/13/2020	11:11:27 AM	20.69036	0.27851	21.409	15.894	0.566
8/13/2020	11:12:27 AM	20.68569	0.27229	24.523	38.35	0.6017
8/13/2020	11:13:27 AM	20.68391	0.277	28.455	31.194	0.6286
8/13/2020	11:14:27 AM	20.6877	0.28292	28.304	78.311	0.7375
8/13/2020	11:15:27 AM	20.70321	0.27794	25.687	76.061	0.7593
8/13/2020	11:16:27 AM	20.69258	0.29723	26.67	50.669	0.8352
8/13/2020	11:17:27 AM	20.69986	0.30244	23.082	73.56	0.8192
8/13/2020	11:18:27 AM	20.69797	0.27869	20.25	45.248	0.8727
8/13/2020	11:19:27 AM	20.69126	0.29608	16.576	12.201	1.0057
8/13/2020	11:20:27 AM	20.69947	0.28627	20.505	9.8149	0.9518
8/13/2020	11:21:27 AM	20.71146	0.28274	23.145	16.735	0.6556
8/13/2020	11:22:27 AM	20.71853	0.26911	30.359	35.07	0.4994
8/13/2020	11:23:27 AM	20.72874	0.27783	24.088	85.37	0.3727
8/13/2020	11:24:27 AM	20.70811	0.28113	25.03	41.657	0.3938
8/13/2020	11:25:27 AM	20.69695	0.27045	16.322	12.607	0.4951
8/13/2020	11:26:27 AM	20.70497	0.27973	18.675	17.292	0.4838
8/13/2020	11:27:27 AM	20.69633	0.28292	20.958	20.706	0.6482
8/13/2020	11:28:27 AM	20.69374	0.26779	23.103	28.388	0.7703
8/13/2020	11:29:27 AM	20.68969	0.28223	17.159	8.0726	0.8625
8/13/2020	11:30:27 AM	20.68639	0.31936	16.337	9.4768	0.9225
8/13/2020	11:31:27 AM	20.68287	0.29256	20.231	17.074	0.9289
8/13/2020	11:32:27 AM	20.68388	0.26414	22.877	26.468	0.8744
8/13/2020	11:33:27 AM	20.68393	0.28146	17.403	30.257	0.9048
8/13/2020	11:34:27 AM	20.69122	0.28257	19.768	41.549	0.873
8/13/2020	11:35:27 AM	20.68874	0.27939	19.738	43.828	0.9041
8/13/2020	11:36:27 AM	20.68291	0.27934	18.063	32.36	0.9835
8/13/2020	11:37:27 AM	20.68385	0.3086	20.796	70.691	1.0883
8/13/2020	11:38:27 AM	20.69203	0.28098	20.965	73.128	1.0362
8/13/2020	11:39:27 AM	20.69367	0.25333	21.82	92.815	1.0372
8/13/2020	11:40:27 AM	20.69226	0.26678	21.675	56.709	1.0125
8/13/2020	11:41:27 AM	20.68574	0.27311	21.865	42.356	1.0795
8/13/2020	11:42:27 AM	20.68014	0.27188	18.854	5.9689	1.1856
8/13/2020	11:43:27 AM	20.67055	0.27977	18.698	6.4877	1.3265

8/13/2020	11:44:27 AM	20.67842	0.28742	19.207	6.7829	1.275
8/13/2020	11:45:27 AM	20.67498	0.27372	18.284	18.29	1.1994
8/13/2020	11:46:27 AM	20.67962	0.26089	16.63	27.089	1.2124
8/13/2020	11:47:27 AM	20.68137	0.26901	18.35	9.1938	1.282
8/13/2020	11:48:27 AM	20.67307	0.27567	14.586	6.0679	1.3302
8/13/2020	11:49:27 AM	20.68032	0.27218	16.782	1.8769	1.325
8/13/2020	11:50:27 AM	20.68684	0.25299	14.301	0.4079	1.3404
8/13/2020	11:51:27 AM	20.6914	0.26417	11.119	0.9354	1.2958
8/13/2020	11:52:27 AM	20.68947	0.28501	12.164	3.6178	1.2502
8/13/2020	11:53:27 AM	20.69095	0.26727	13.133	1.5799	1.3047
8/13/2020	11:54:27 AM	20.6927	0.25107	13.115	0.0497	1.4089
8/13/2020	11:55:27 AM	20.68504	0.26285	13.927	3.5507	1.3573
8/13/2020	11:56:27 AM	20.68448	0.26264	18.928	7.0844	1.2546
8/13/2020	11:57:27 AM	20.66912	0.27986	24.133	17.752	1.3538
8/13/2020	11:58:27 AM	20.67651	0.27734	18.158	8.8983	1.5065
8/13/2020	11:59:27 AM	20.66465	0.3023	16.059	5.5571	1.6364
8/13/2020	12:00:27 PM	20.66842	0.27611	18.163	4.942	1.5825
8/13/2020	12:01:27 PM	20.67569	0.25269	18.839	4.3819	1.4652
8/13/2020	12:02:27 PM	20.67817	0.26383	15.159	2.0289	1.4734
8/13/2020	12:03:27 PM	20.6798	0.26641	12.3	0.0654	1.4078
8/13/2020	12:04:27 PM	20.68307	0.26165	11.892	1.2629	1.3209
8/13/2020	12:05:27 PM	20.67973	0.26226	15.999	2.7275	1.3166
8/13/2020	12:06:27 PM	20.67918	0.27574	16.369	1.9143	1.398
8/13/2020	12:07:27 PM	20.68117	0.26843	14.217	-1.363	1.4084
8/13/2020	12:08:27 PM	20.67692	0.24964	12.288	-3.027	1.4665
8/13/2020	12:09:27 PM	20.68869	0.24911	12.626	-1.936	1.4313
8/13/2020	12:10:27 PM	20.69974	0.25699	14.173	0.7052	1.4883
8/13/2020	12:11:27 PM	20.69436	0.25736	15.681	2.0412	1.4486
8/13/2020	12:12:27 PM	20.69574	0.25813	16.652	-0.117	1.4709
8/13/2020	12:13:27 PM	20.69573	0.27029	15.29	1.7558	1.4461
8/13/2020	12:14:27 PM	20.70055	0.25272	15.522	1.3901	1.3386
8/13/2020	12:15:27 PM	20.70344	0.23738	13.282	0.1448	1.3948
8/13/2020	12:16:27 PM	20.6898	0.2615	14.736	-2.833	1.4073
8/13/2020	12:17:27 PM	20.63969	0.29266	24.926	-0.793	1.6421
8/13/2020	12:18:27 PM	20.61812	0.29929	41.237	-0.57	1.6948
8/13/2020	12:20:27 PM	20.65724	0.28356	25.226	0.4003	0.8184
8/13/2020	12:21:27 PM	20.67698	0.2672	12.976	-2.651	0.5313
8/13/2020	12:22:27 PM	20.67369	0.24058	12.03	-0.48	0.429
8/13/2020	12:23:27 PM	20.67374	0.25336	11.484	-5.577	0.3716
8/13/2020	12:24:27 PM	20.67559	0.25053	10.03	1.2016	0.2915
8/13/2020	12:25:27 PM	20.67706	0.26211	10.435	4.1267	0.2247
8/13/2020	12:26:27 PM	20.68192	0.26947	9.6196	-1.154	0.2725
Average		20.69	0.28	19.83	26.01	0.90

CEM Data

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Project Number:	50074.0221
CEM Operator:	Chris Janzen

Run 3		O2	CO2	CO	TGO	NOx
Date	Time	%	%	ppm	ppm	ppm
8/13/2020	3:14:27 PM	20.69173	0.2405	12.927	32.166	0.0726
8/13/2020	3:15:27 PM	20.68191	0.23804	22.047	29.788	0.0822
8/13/2020	3:16:27 PM	20.68396	0.23476	27.564	32.333	0.1033
8/13/2020	3:17:27 PM	20.68278	0.24135	24.073	33.049	0.0915
8/13/2020	3:18:27 PM	20.6873	0.25629	24.532	36.671	0.088
8/13/2020	3:19:27 PM	20.67513	0.23571	30.842	30.26	0.1094
8/13/2020	3:20:27 PM	20.6325	0.26281	28.704	21.109	0.9221
8/13/2020	3:21:27 PM	20.63346	0.26914	19.643	16.092	1.1293
8/13/2020	3:22:27 PM	20.62693	0.26482	18.981	11.231	1.1495
8/13/2020	3:23:27 PM	20.62805	0.2703	20.246	14.344	1.0718
8/13/2020	3:24:27 PM	20.62771	0.27304	21.576	24.5	0.9785
8/13/2020	3:25:27 PM	20.62414	0.29362	21.731	13.953	0.9168
8/13/2020	3:26:27 PM	20.62125	0.299	20.845	11.537	0.8692
8/13/2020	3:27:27 PM	20.61622	0.26898	19.689	12.273	0.9666
8/13/2020	3:28:27 PM	20.63798	0.2594	16.892	13.497	0.7488
8/13/2020	3:29:27 PM	20.64321	0.25767	17.502	17.515	0.661
8/13/2020	3:30:27 PM	20.64235	0.2637	17.92	18.938	0.6434
8/13/2020	3:31:27 PM	20.64242	0.26007	21.721	26.52	0.6071
8/13/2020	3:32:27 PM	20.64182	0.29002	23.961	21.677	0.5797
8/13/2020	3:33:27 PM	20.64165	0.26606	21.38	18.992	0.541
8/13/2020	3:34:27 PM	20.6409	0.24158	18.228	15.489	0.5091
8/13/2020	3:35:27 PM	20.63798	0.26494	17.322	21.689	0.5189
8/13/2020	3:36:27 PM	20.639	0.26383	18.91	22.388	0.5422
8/13/2020	3:37:27 PM	20.63707	0.24749	17.081	20.779	0.5725
8/13/2020	3:38:27 PM	20.62272	0.27614	18.716	23.981	0.5788
8/13/2020	3:39:27 PM	20.63261	0.28198	20.194	23.934	0.5819
8/13/2020	3:40:27 PM	20.63419	0.27395	22.192	25.086	0.6072
8/13/2020	3:41:27 PM	20.63274	0.24243	18.931	22.504	0.6493
8/13/2020	3:42:27 PM	20.64023	0.25343	14.617	21.283	0.5328
8/13/2020	3:43:27 PM	20.64195	0.24539	19.609	28.05	0.4984
8/13/2020	3:44:27 PM	20.64374	0.2555	21.633	27.04	0.4553
8/13/2020	3:45:27 PM	20.63633	0.25688	20.493	23.265	0.4528
8/13/2020	3:46:27 PM	20.64046	0.26915	17.769	26.026	0.4866
8/13/2020	3:47:27 PM	20.64413	0.2602	21.206	28.692	0.5531
8/13/2020	3:48:27 PM	20.6423	0.23307	19.642	23.219	0.5742
8/13/2020	3:49:27 PM	20.64379	0.24396	17.52	22.226	0.6424
8/13/2020	3:50:27 PM	20.64204	0.25864	16.824	22.745	0.5994
8/13/2020	3:51:27 PM	20.64186	0.24701	16.746	23.099	0.5787
8/13/2020	3:52:27 PM	20.64039	0.23789	17.528	23.616	0.6286
8/13/2020	3:53:27 PM	20.6412	0.26786	16.292	22.37	0.6391
8/13/2020	3:54:27 PM	20.64471	0.26282	14.843	21.507	0.6342
8/13/2020	3:55:27 PM	20.64316	0.236	14.741	23.387	0.6432
8/13/2020	3:56:27 PM	20.64728	0.23708	16.926	23.751	0.6179
8/13/2020	3:57:27 PM	20.64827	0.24047	16.566	26.122	0.6329
8/13/2020	3:58:27 PM	20.64516	0.24605	15.318	24.147	0.6587
8/13/2020	3:59:27 PM	20.64519	0.24731	14.322	25.202	0.686
8/13/2020	4:00:27 PM	20.6461	0.24417	16.787	23.81	0.6993
8/13/2020	4:01:27 PM	20.66983	0.24622	16.732	17.366	0.6378
8/13/2020	4:02:27 PM	20.64883	0.23444	14.526	24.597	0.6241
8/13/2020	4:03:27 PM	20.63891	0.24918	14.195	34.878	0.5927
8/13/2020	4:04:27 PM	20.64201	0.24545	13.578	30.025	0.5789
8/13/2020	4:05:27 PM	20.63691	0.25307	13.059	20.239	0.5948
8/13/2020	4:06:27 PM	20.62945	0.26664	15.503	22.016	0.6338
8/13/2020	4:07:27 PM	20.6309	0.26089	14.403	18.131	0.6704
8/13/2020	4:08:27 PM	20.63208	0.27541	14.11	15.181	0.7021
8/13/2020	4:09:27 PM	20.63112	0.2672	13.127	26.624	0.6881
8/13/2020	4:10:27 PM	20.63101	0.24444	19.558	35.436	0.7003
8/13/2020	4:11:27 PM	20.6333	0.26634	21.682	28.372	0.6889
8/13/2020	4:12:27 PM	20.62993	0.2538	14.183	19.957	0.7537
8/13/2020	4:13:27 PM	20.63308	0.26069	12.739	22.33	0.6921
8/13/2020	4:14:27 PM	20.62833	0.26228	14.611	31.12	0.6671
8/13/2020	4:15:27 PM	20.6252	0.2975	15.869	16.191	0.6806
8/13/2020	4:16:27 PM	20.63059	0.27069	13.888	23.941	0.6602
8/13/2020	4:17:27 PM	20.62937	0.24908	15.485	28.328	0.6735
8/13/2020	4:18:27 PM	20.6307	0.29524	16.309	19.185	0.7459
8/13/2020	4:19:27 PM	20.63082	0.29653	17.578	19.514	0.7918
8/13/2020	4:20:27 PM	20.63207	0.28467	14.975	19.713	0.7479

8/13/2020	4:21:27 PM	20.63131	0.25543	13.909	21.547	0.7515
8/13/2020	4:22:27 PM	20.63135	0.25333	12.846	15.274	0.7685
8/13/2020	4:23:27 PM	20.63357	0.27839	12.994	28.078	0.7548
8/13/2020	4:24:27 PM	20.63083	0.243	13.879	24.918	0.7374
8/13/2020	4:25:27 PM	20.63085	0.24068	13.908	17.408	0.8076
8/13/2020	4:26:27 PM	20.62966	0.24769	12.536	14.44	0.7552
8/13/2020	4:27:27 PM	20.62986	0.24741	11.803	21.024	0.7473
8/13/2020	4:28:27 PM	20.63112	0.25136	13.798	21.569	0.7913
8/13/2020	4:29:27 PM	20.63234	0.25603	13.019	21.216	0.7871
8/13/2020	4:30:27 PM	20.63197	0.28654	11.747	15.532	0.8346
8/13/2020	4:31:27 PM	20.63105	0.23366	12.076	17.823	0.8735
8/13/2020	4:32:27 PM	20.6393	0.22647	14.326	22.041	0.8122
8/13/2020	4:33:27 PM	20.65034	0.23603	14.444	15.974	0.8671
8/13/2020	4:34:27 PM	20.64324	0.26921	14.365	18.164	0.7861
8/13/2020	4:35:27 PM	20.62277	0.27169	20.588	29.673	0.7848
8/13/2020	4:36:27 PM	20.6409	0.24772	18.066	23	0.744
8/13/2020	4:37:27 PM	20.63908	0.28089	17.211	23.663	0.7287
8/13/2020	4:38:27 PM	20.6433	0.26099	17.732	25.696	0.7278
8/13/2020	4:39:27 PM	20.63616	0.2517	20.123	32.387	0.5968
8/13/2020	4:40:27 PM	20.63749	0.26566	20.258	32.699	0.4184
8/13/2020	4:41:27 PM	20.65312	0.25252	15.805	36.684	0.381
8/13/2020	4:42:27 PM	20.64326	0.26996	18.625	31.321	0.6391
8/13/2020	4:43:27 PM	20.64276	0.25726	20.221	24.344	0.6982
8/13/2020	4:44:27 PM	20.64526	0.24705	17.641	25.418	0.7439
8/13/2020	4:45:27 PM	20.64341	0.33107	18.54	24.075	0.7306
8/13/2020	4:46:27 PM	20.64609	0.28153	17.762	27.451	0.7589
8/13/2020	4:47:27 PM	20.64267	0.2723	17.85	23.152	0.7593
8/13/2020	4:48:27 PM	20.64261	0.29435	16.364	20.413	0.7225
8/13/2020	4:49:27 PM	20.6426	0.28881	13.672	21.017	0.7785
8/13/2020	4:50:27 PM	20.64317	0.7094	14.434	21.584	0.7549
8/13/2020	4:51:27 PM	20.64294	2.23544	13.531	19.438	0.7976
8/13/2020	4:52:27 PM	20.64068	3.52182	14.397	18.777	0.8066
8/13/2020	4:53:27 PM	20.6389	2.19338	14.58	17.891	0.8024
8/13/2020	4:54:27 PM	20.63693	0.28883	13.994	23.512	0.8445
8/13/2020	4:55:27 PM	20.63604	0.30472	15.181	23.561	0.8015
8/13/2020	4:56:27 PM	20.63196	0.2649	18.844	21.18	0.827
8/13/2020	4:57:27 PM	20.63227	0.26123	17.281	24.063	0.9076
8/13/2020	4:58:27 PM	20.63472	0.25136	14.731	18.64	0.8943
8/13/2020	4:59:27 PM	20.64061	0.249	14.381	21.221	0.8722
8/13/2020	5:00:27 PM	20.65146	0.25835	15.228	14.063	0.8215
8/13/2020	5:01:27 PM	20.64449	0.23818	11.385	14.851	0.8224
8/13/2020	5:02:27 PM	20.64272	0.23845	14.025	20.229	0.8257
8/13/2020	5:03:27 PM	20.64474	0.23411	17.527	23.237	0.7745
8/13/2020	5:04:27 PM	20.63653	0.23803	17.817	17.417	0.8154
8/13/2020	5:05:27 PM	20.63574	0.23657	16.72	19.328	0.8211
8/13/2020	5:06:27 PM	20.63575	0.23681	14.221	14.29	0.8056
8/13/2020	5:07:27 PM	20.63074	0.28389	11.991	23.566	0.7981
8/13/2020	5:08:27 PM	20.63081	0.26001	13.883	27.462	0.8031
8/13/2020	5:09:27 PM	20.63078	0.24388	11.504	26.345	0.7669
8/13/2020	5:10:27 PM	20.63159	0.24214	11.018	30.613	0.7227
8/13/2020	5:11:27 PM	20.63471	0.23567	11.369	31.178	0.7328
8/13/2020	5:12:27 PM	20.62979	0.25604	10.885	30.393	0.7289
8/13/2020	5:13:27 PM	20.63066	0.2451	12.041	30.98	0.7327
8/13/2020	5:14:27 PM	20.63024	0.28245	12.722	32.877	0.7592
8/13/2020	5:15:27 PM	20.62525	0.3111	16.111	26.691	0.7527
8/13/2020	5:16:27 PM	20.6304	0.25713	18.081	36.006	0.6883
8/13/2020	5:17:27 PM	20.62338	0.24647	21.076	29.441	0.7719
8/13/2020	5:18:27 PM	20.60944	0.27358	24.595	31.409	0.9625
8/13/2020	5:19:27 PM	20.60988	0.28044	20.411	31.519	0.9516
8/13/2020	5:20:27 PM	20.64165	0.2538	17.714	33.064	0.8079
8/13/2020	5:21:27 PM	20.64521	0.25546	18.742	32.864	0.6811
8/13/2020	5:22:27 PM	20.63648	0.36242	20.032	40.996	0.6742
8/13/2020	5:23:27 PM	20.60684	0.26397	28.887	29.391	0.793
8/13/2020	5:24:27 PM	20.58652	0.29541	42.767	27.888	0.9159
Average		20.64	0.32	17.24	23.72	0.69

CEM Data

Plant Name:	AK Dearborn
Sampling Location:	C Furnace Baghouse
Project Number:	50074.0221
CEM Operator:	Chris Janzen

Run 4		O2	CO2	CO	TGO	NOx
Date	Time	%	%	ppm	ppm	ppm
8/13/2020	5:38:27 PM	20.79551	1.2877	18.727	31.98	0.0389
8/13/2020	5:39:27 PM	20.79982	1.09097	19.227	29.354	0.0623
8/13/2020	5:40:27 PM	20.78856	0.9937	24.579	33.46	0.0648
8/13/2020	5:41:27 PM	20.74901	1.08231	25.818	23.326	0.3723
8/13/2020	5:42:27 PM	20.72052	1.06769	33.547	22.14	0.5046
8/13/2020	5:43:27 PM	20.73584	1.4356	29.156	18.835	0.4921
8/13/2020	5:44:27 PM	20.72882	1.72723	27.615	17.137	0.4701
8/13/2020	5:45:27 PM	20.72754	1.89255	28.756	17.107	0.4536
8/13/2020	5:46:27 PM	20.73049	1.01867	27.573	19.473	0.4404
8/13/2020	5:47:27 PM	20.72207	1.08745	27.062	18.337	0.4805
8/13/2020	5:48:27 PM	20.68477	1.0836	30.463	19.044	0.5381
8/13/2020	5:49:27 PM	20.67446	1.1745	29.318	17.864	0.5484
8/13/2020	5:50:27 PM	20.68684	0.76099	29.079	17.564	0.5623
8/13/2020	5:51:27 PM	20.68407	1.10723	28.198	18.603	0.6432
8/13/2020	5:52:27 PM	20.67802	1.37327	29.727	16.195	0.7981
8/13/2020	5:53:27 PM	20.68999	1.47962	31.059	19.409	0.6586
8/13/2020	5:54:27 PM	20.70034	1.05384	30.515	17.285	0.5843
8/13/2020	5:55:27 PM	20.70358	1.16418	29.044	16.286	0.5952
8/13/2020	5:56:27 PM	20.725	1.17065	27.747	15.302	0.5963
8/13/2020	5:57:27 PM	20.72041	1.02389	28.178	14.122	0.608
8/13/2020	5:58:27 PM	20.72122	1.06721	26.905	13.097	0.6516
8/13/2020	5:59:27 PM	20.71986	0.84571	24.969	9.9705	0.6588
8/13/2020	6:00:27 PM	20.70959	0.8797	24.457	13.159	0.6526
8/13/2020	6:01:27 PM	20.66512	0.77758	35.083	12.381	0.6765
8/13/2020	6:02:27 PM	20.6667	0.95449	25.321	12.638	0.7541
8/13/2020	6:03:27 PM	20.67647	1.19147	20.814	10.999	0.7103
8/13/2020	6:04:27 PM	20.69738	1.00859	15.727	14.029	0.693
8/13/2020	6:05:27 PM	20.69515	0.66779	15.728	14.748	0.6927
8/13/2020	6:06:27 PM	20.69432	0.74614	16.335	13.653	0.6955
8/13/2020	6:07:27 PM	20.69437	0.88113	15.382	13.616	0.7206
8/13/2020	6:08:27 PM	20.69795	0.97403	16.936	16.522	0.7127
8/13/2020	6:09:27 PM	20.69378	1.03377	18.272	15.432	0.7323
8/13/2020	6:10:27 PM	20.69214	0.88463	19.585	15.381	0.6918
8/13/2020	6:11:27 PM	20.68843	1.32316	17.921	14.291	0.7304
8/13/2020	6:12:27 PM	20.68845	0.70823	17.167	14.392	0.7336
8/13/2020	6:13:27 PM	20.69017	0.66542	16.672	14.16	0.7442
8/13/2020	6:14:27 PM	20.69132	0.51683	16.152	12.432	0.6915
8/13/2020	6:15:27 PM	20.69448	0.35455	15.905	14.37	0.5852
8/13/2020	6:16:27 PM	20.69677	1.21674	17.551	14.861	0.6176
8/13/2020	6:17:27 PM	20.69452	1.31439	16.1	13.735	0.588
8/13/2020	6:18:27 PM	20.69708	0.71162	17.071	15.285	0.6544
8/13/2020	6:19:27 PM	20.69751	0.76136	17.583	20.701	0.6651
8/13/2020	6:20:27 PM	20.69108	0.89273	19.303	14.554	0.6259
8/13/2020	6:21:27 PM	20.69452	0.90793	19.293	15.295	0.5722
8/13/2020	6:22:27 PM	20.69984	1.50224	17.357	15.456	0.5452
8/13/2020	6:23:27 PM	20.72016	0.09682	17.339	13.609	0.6139
8/13/2020	6:24:27 PM	20.70879	0.11396	21.269	12.496	0.9187
8/13/2020	6:25:27 PM	20.71415	0.10512	18.196	14.468	0.7805
8/13/2020	6:26:27 PM	20.71803	0.10421	19.539	16.633	0.7403
8/13/2020	6:27:27 PM	20.71693	0.10478	20.483	11.62	0.681
8/13/2020	6:28:27 PM	20.71489	0.10485	17.184	10.841	0.5837
8/13/2020	6:29:27 PM	20.71611	0.10707	12.684	9.852	0.5574
8/13/2020	6:30:27 PM	20.71351	0.10502	11.076	8.8822	0.5291
8/13/2020	6:31:27 PM	20.71611	0.10288	10.942	11.106	0.5691
8/13/2020	6:32:27 PM	20.71077	0.1038	13.564	12.352	0.5963
8/13/2020	6:33:27 PM	20.71012	0.10251	16.005	14.262	0.6229
8/13/2020	6:34:27 PM	20.71718	0.10074	15.926	12.706	0.6018
8/13/2020	6:35:27 PM	20.71267	0.1066	14.801	9.7582	0.598
8/13/2020	6:36:27 PM	20.71735	0.09295	15.959	9.0413	0.4112
8/13/2020	6:37:27 PM	20.7156	0.04576	18.764	7.6216	0.9085
8/13/2020	6:38:27 PM	20.75073	0.09243	13.49	20.902	0.0431
8/13/2020	6:39:27 PM	20.71526	0.09232	20.461	6.9019	0.9388
8/13/2020	6:40:27 PM	20.71436	0.0763	12.494	25.599	0.0596
8/13/2020	6:41:27 PM	20.71373	0.08561	15.703	17.416	0.4036
8/13/2020	6:42:27 PM	20.71665	0.13251	11.691	26.618	0.0095
8/13/2020	6:43:27 PM	20.71849	0.37003	15.749	22.421	0.3695
8/13/2020	6:44:27 PM	20.73097	0.58056	23.22	3.714	1.5229

8/13/2020	6:45:27 PM	20.7196	0.05075	13.007	26.782	0.0597
8/13/2020	6:46:27 PM	20.7244	0.03055	19.643	11.775	0.7576
8/13/2020	6:47:27 PM	20.68316	0.26287	15.462	28.203	0.0444
8/13/2020	6:48:27 PM	20.70984	0.05572	14.734	26.143	0.3269
8/13/2020	6:49:27 PM	20.70536	0.2159	12.679	19.017	0.0371
8/13/2020	6:50:27 PM	20.70692	0.08552	12.004	17.222	0.0286
8/13/2020	6:51:27 PM	20.70556	0.34028	15.106	10.5	0.3739
8/13/2020	6:52:27 PM	20.70394	0.17932	13.855	12.894	0.2507
8/13/2020	6:53:27 PM	20.72816	0.15551	15.063	10.064	0.4551
8/13/2020	6:54:27 PM	20.71581	0.26582	14.269	11.205	0.3839
8/13/2020	6:55:27 PM	20.71	0.16816	14.335	12.018	0.3768
8/13/2020	6:56:27 PM	20.69729	0.16066	14.475	11.266	0.4013
8/13/2020	6:57:27 PM	20.7327	0.19145	15.63	10.575	0.5375
8/13/2020	6:58:27 PM	20.73208	0.05661	12.979	20.795	0.1659
8/13/2020	6:59:27 PM	20.7317	0.15814	20.276	7.2849	1.2372
8/13/2020	7:00:27 PM	20.72061	0.1918	16.252	13.413	0.5465
8/13/2020	7:01:27 PM	20.71865	0.07573	14.528	15.09	0.3716
8/13/2020	7:02:27 PM	20.7406	0.11951	16.245	14.525	0.5606
8/13/2020	7:03:27 PM	20.17521	0.17897	15.223	16.994	0.3908
8/13/2020	7:04:27 PM	20.71565	0.12294	16.66	11.804	0.6237
8/13/2020	7:05:27 PM	20.69771	0.05571	14.689	16.613	0.2947
8/13/2020	7:06:27 PM	21.77282	0.125	19.963	15.385	1.1573
8/13/2020	7:07:27 PM	21.73214	0.11154	16.383	14.846	0.4761
8/13/2020	7:08:27 PM	21.63248	0.1126	13.729	19.794	0.1459
8/13/2020	7:09:27 PM	21.74727	0.09006	16.665	15.793	0.5521
8/13/2020	7:10:27 PM	21.71591	0.18026	11.834	26.112	0.0208
8/13/2020	7:11:27 PM	21.70316	0.05342	15.128	21.5	0.424
8/13/2020	7:12:27 PM	21.74798	0.02457	19.057	9.1136	0.8907
8/13/2020	7:13:27 PM	21.72916	0.24086	11.788	22.669	0.012
8/13/2020	7:14:27 PM	21.67757	0.1408	16.232	13.525	0.5238
8/13/2020	7:15:27 PM	21.74287	0.27136	15.231	19.395	0.4947
8/13/2020	7:16:27 PM	21.75824	0.14261	14.106	20.32	0.0401
8/13/2020	7:17:27 PM	21.63165	0.15006	15.354	17.044	0.4511
8/13/2020	7:18:27 PM	21.70259	0.19455	16.504	13.363	0.3455
8/13/2020	7:19:27 PM	21.7774	0.52763	19.382	9.279	0.9046
8/13/2020	7:20:27 PM	21.73581	0.09489	13.479	23.953	0.1222
8/13/2020	7:21:27 PM	21.60773	0.10512	19.872	15.006	1.0525
8/13/2020	7:22:27 PM	21.69824	0.09368	13.252	21.017	0.1196
8/13/2020	7:23:27 PM	21.7259	0.07071	18.715	20.173	0.9025
8/13/2020	7:24:27 PM	21.761	0.06161	14.357	19.579	0.1223
8/13/2020	7:25:27 PM	21.7372	0.16888	12.912	24.948	0.0259
8/13/2020	7:26:27 PM	21.70858	0.18223	15.758	18.102	0.5073
8/13/2020	7:27:27 PM	21.73288	0.08191	17.765	16.45	0.8226
8/13/2020	7:28:27 PM	21.83672	0.11767	15	21.383	0.3871
8/13/2020	7:29:27 PM	21.77169	0.16922	15.116	12.549	0.3474
8/13/2020	7:30:27 PM	21.78241	0.05661	14.12	9.3729	0.0526
8/13/2020	7:31:27 PM	20.80101	0.05685	12.949	15.441	0.5635
8/13/2020	7:32:27 PM	20.6844	0.07028	12.78	14.218	0.5366
8/13/2020	7:33:27 PM	20.77006	0.06412	13.749	10.028	0.6298
8/13/2020	7:34:27 PM	20.80908	0.06017	12.716	13.983	0.6544
8/13/2020	7:35:27 PM	20.75398	0.06794	16.181	15.604	0.7467
8/13/2020	7:36:27 PM	20.71716	0.07326	17.106	13.426	0.7694
8/13/2020	7:37:27 PM	20.76192	0.07381	21.57	14.86	0.8695
Average		20.92	0.47	18.43	15.99	0.53

APPENDIX C
ANALYTICAL DATA

PROJECT ANALYTICAL SHEET (sheet 1 of 1)

Project Name: AK Steel Dearborn			Project No.: 050074.0221/2		
Project Date(s): August 11 & 13, 2020			Project Manager: Allen		
Method(s): 5			No. of Sites: 2		
Date/Time(s) in Dessicator: July 17, 2020 8:00 AM					
RUN NO.	ID NO.	#/DESCRIPTION	TARE MASS	FINAL MASS	NET MASS
S-202-1	2020-225	Filter 833189	326.00	337.85	11.85
S-202-1	2020-226	Acetone 1487	106,035.10	106,024.1	19.0
S-202-2	2020-227	Filter 833188	324.40	328.75	4.35
S-202-2	2020-228	Acetone 1488	104,760.25	104,768.15	7.9
S-202-3	2020-229	Filter 833190	323.95	326.55	2.6
S-202-3	2020-230	Acetone 1489	108,384.60	108,404.25	19.65
B-202-1	2020-231	Filter 833259	369.10	369.15	0.05
B-202-1	2020-232	Acetone 1490	107,914.90	107,916.5	1.6
B-202-2	2020-233	Filter 833260	372.95	372.95	0.0
B-202-2	2020-234	Acetone 1491	104,482.75	104,485.55	2.8
B-202-3	2020-235	Filter 833287	371.60	317.75	6.15
B-202-3	2020-236	Acetone 1492	105,770.35	105,773.2	2.85
B-202-4	2020-237	Filter 833258	367.95	368.25	0.30
B-202-4	2020-238	Acetone 1493	108,439.65	108,443.2	3.55
BLANK	2020-239	Filter 833261	371.90	371.9	0.0
BLANK	2020-240	Acetone 1494	105,920.00	105,920.6	0.6
S-202-FB	2020-241	Filter 833313	345.00	345.05	0.05
S-202-FB	2020-242	Acetone 1495	106,447.60	106,447.75	0.15
B-202-FB	2020-243	Filter 833314	348.20	348.2	0.0
B-202-FB	2020-244	Acetone 1496	103,544.15	103,544.35	6.20

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE STOVE</u>		Run No.: <u>S-202-1</u>	
Filter No.: <u>833189</u>		I.D. No.: <u>2020-225</u>	
		Tare Mass (mg.): <u>326.00</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1248</u>	<u>CS</u>	<u>338.1</u>	
#2 <u>8/26/20 1301</u>	<u>DA</u>	<u>337.6</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>337.85</u>	
Comments:		Net Gain (mg): <u>11.85</u>	
F/H Beaker No.: <u>1487</u>		I.D. No.: <u>2020-226</u>	
		Tare Mass (mg): <u>106,035.10</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1258</u>	<u>CS</u>	<u>106,054.3</u>	
#2 <u>8/26/20 1302</u>	<u>DA</u>	<u>106,053.9</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>106,054.1</u>	
Comments:		Net Gain (mg): <u>19.0</u>	

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE STOVE</u>		Run No.: <u>S-202-2</u>	
Filter No.: <u>833188</u>		I.D. No.: <u>2020-227</u>	
		Tare Mass (mg.): <u>324.40</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1249</u>	<u>CJ</u>	<u>328.8</u>	
#2 <u>8/26/20 1302</u>	<u>DA</u>	<u>328.7</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>328.75</u>	
Comments:		Net Gain (mg): <u>4.35</u>	
F/H Beaker No.: <u>1488</u>		I.D. No.: <u>2020-228</u>	
		Tare Mass (mg): <u>104,760.25</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1258</u>	<u>CJ</u>	<u>104,768.3</u>	
#2 <u>8/26/20 1303</u>	<u>DA</u>	<u>104768.0</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>104768.15</u>	
Comments:		Net Gain (mg): <u>7.9</u>	

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE STOVE</u>		Run No.: <u>S-202-3</u>	
Filter No.: <u>833190</u>		I.D. No.: <u>2020-229</u>	
		Tare Mass (mg.): <u>323.95</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1250</u>	<u>CT</u>	<u>326.6</u>	
#2 <u>8/26/20 1303</u>	<u>DA</u>	<u>326.5</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>326.55</u>	
Comments:		Net Gain (mg): <u>2.6</u>	
F/H Beaker No.: <u>1489</u>		I.D. No.: <u>2020-230</u>	
		Tare Mass (mg): <u>108,384.60</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1259</u>	<u>CT</u>	<u>108,404.2</u>	
#2 <u>8/26/20 1304</u>	<u>DA</u>	<u>108404.3</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>108404.25</u>	
Comments:		Net Gain (mg): <u>19.65</u>	

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE BAGHOUSE</u>		Run No.: <u>B-202-1</u>	
Filter No.: <u>833259</u>		I.D. No.: <u>2020-231</u>	
		Tare Mass (mg.): <u>369.10</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1251</u>	<u>CJ</u>	<u>369.10</u>	
#2 <u>8/26/20 1305</u>	<u>DA</u>	<u>396.2</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>396.15</u>	
Comments:		Net Gain (mg): <u>0.05</u>	
F/H Beaker No.: <u>1490</u>		I.D. No.: <u>2020-232</u>	
		Tare Mass (mg): <u>107,914.90</u>	
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>	
#1 <u>8/21/20 1259</u>	<u>CJ</u>	<u>107,916.7</u>	
#2 <u>8/26/20 1305</u>	<u>DA</u>	<u>107916.3</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass (mg): <u>107916.5</u>	
Comments:		Net Gain (mg): <u>1.6</u>	

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE BAGHOUSE</u>		Run No.: <u>B-202-2</u>
Filter No.: <u>833260</u>		I.D. No.: <u>2020-233</u>
Tare Mass (mg.): <u>372.95</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1252</u>	<u>CJ</u>	<u>373.0</u>
#2 <u>8/24/20 1307</u>	<u>DA</u>	<u>372.9</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): <u>372.95</u>
Comments:		Net Gain (mg): <u>0.0</u>
F/H Beaker No.: <u>1491</u>		I.D. No.: <u>2020-234</u>
Tare Mass (mg): <u>104,482.75</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1300</u>	<u>CJ</u>	<u>104,485.7</u>
#2 <u>8/26/20 1307</u>	<u>DA</u>	<u>104485.4</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): <u>104485.55</u>
Comments:		Net Gain (mg): <u>2.8</u>

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE BAGHOUSE</u>		Run No.: <u>B-202-3</u>
Filter No.: <u>833287</u>		I.D. No.: <u>2020-235</u>
Tare Mass (mg.): <u>371.60</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1252</u>	<u>CS</u>	<u>371.7</u>
#2 <u>8/26/20 1308</u>	<u>DA</u>	<u>371.8</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): <u>2175 317.75</u>
Comments:		Net Gain (mg): <u>0.15</u>
F/H Beaker No.: <u>1492</u>		I.D. No.: <u>2020-236</u>
Tare Mass (mg): <u>105,770.35</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1300</u>	<u>CS</u>	<u>105,773.3</u>
#2 <u>8/26/20 1308</u>	<u>DA</u>	<u>105,773.1</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): <u>105,773.2</u>
Comments:		Net Gain (mg): <u>2.85</u>

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE BAGHOUSE</u>		Run No.: <u>B-202-4</u>	
Filter No.: <u>833258</u>		I.D. No.: <u>2020-237</u>	
		Tare Mass (mg.): <u>367.95</u>	
<u>Date/Time</u>		<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1253</u>		<u>CJ</u>	<u>368.0</u>
#2 <u>8/26/20 1309</u>		<u>DA</u>	<u>368.5</u>
#3 _____		_____	_____
#4 _____		_____	_____
		Avg. Mass (mg): <u>368.25</u>	
Comments:		Net Gain (mg): <u>0.30</u>	
F/H Beaker No.: <u>1493</u>		I.D. No.: <u>2020-238</u>	
		Tare Mass (mg): <u>108,439.65</u>	
<u>Date/Time</u>		<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1301</u>		<u>CJ</u>	<u>108,443.4</u>
#2 <u>8/26/20 1309</u>		<u>DA</u>	<u>108443.0</u>
#3 _____		_____	_____
#4 _____		_____	_____
		Avg. Mass (mg): <u>108443.2</u>	
Comments:		Net Gain (mg): <u>3.55</u>	

PROJECT ANALYTICAL SHEET

BLANK ANALYSIS			
Filter No.: <u>833261</u>		I.D. No.: <u>2020-239</u>	
Final Mass: _____		Tare Mass: <u>371.90</u>	
Date/Time	Name	Mass	
#1 <u>8/21/20 1254</u>	<u>CJ</u>	<u>371.9</u>	
#2 <u>8/26/20 1310</u>	<u>DA</u>	<u>371.9</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass: _____	
		Net Gain: _____	
Acetone Beaker No.: <u>1494</u>		I.D. No.: <u>2020-240</u>	
Final Mass: _____		Tare Mass: <u>105,920.00</u>	
Date/Time	Name	Mass	
#1 <u>8/21/20 1301</u>	<u>CJ</u>	<u>105,920.7</u>	
#2 <u>8/26/20 1310</u>	<u>DA</u>	<u>105920.5</u>	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass: _____	
		Net Gain: _____	
DI Water Beaker No.: _____		I.D. No. _____	
Final Mass: _____		Tare Mass: _____	
Date/Time	Name	Mass	
#1 _____	_____	_____	
#2 _____	_____	_____	
#3 _____	_____	_____	
#4 _____	_____	_____	
		Avg. Mass: _____	
		Net Gain: _____	

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE STOVE</u>		Run No.: <u>ES-202-FB</u>
Filter No.: <u>833313</u>		I.D. No.: <u>2020-241</u>
Tare Mass (mg.): <u>345.00</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1255</u>	<u>CJ</u>	<u>345.1</u>
#2 <u>8/26/20 1311</u>	<u>DA</u>	<u>345.0</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): _____
Comments:		Net Gain (mg): _____
F/H Beaker No.: <u>1495</u>		I.D. No.: <u>2020-242</u>
Tare Mass (mg): <u>106,447.60</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1302</u>	<u>CJ</u>	<u>106,447.8</u>
#2 <u>8/26/20 1311</u>	<u>DA</u>	<u>106447.7</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): _____
Comments:		Net Gain (mg): _____

PROJECT ANALYTICAL SHEET

Site: <u>C FURNACE BAGHOUSE</u>		Run No.: <u>B-202-FB</u>
Filter No.: <u>833314</u>		I.D. No.: <u>2020-243</u>
Tare Mass (mg.): <u>348.20</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1256</u>	<u>CJ</u>	<u>348.2</u>
#2 <u>8/26/20 1312</u>	<u>DA</u>	<u>348.2</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): _____
Comments:		Net Gain (mg): _____
F/H Beaker No.: <u>1496</u>		I.D. No.: <u>2020-244</u>
Tare Mass (mg): <u>103544.15</u>		
<u>Date/Time</u>	<u>Name</u>	<u>Mass (mg)</u>
#1 <u>8/21/20 1303</u>	<u>CJ</u>	<u>103,544.3</u>
#2 <u>8/26/20 1312</u>	<u>DA</u>	<u>103544.7</u>
#3 _____	_____	_____
#4 _____	_____	_____
		Avg. Mass (mg): _____
Comments:		Net Gain (mg): _____



24-Aug-2020

Doug Allen
Environmental Quality Management
1800 Carillon Boulevard
Cincinnati, OH 45240

Re: **AK Dearborn; 050074.0221/2**

Work Order: **20080501**

Dear Doug,

ALS Environmental received 8 samples on 14-Aug-2020 02:34 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 10.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Shawn Smythe

Shawn Smythe
Project Manager

Report of Laboratory Analysis

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
Work Order: 20080501

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20080501-01	S-202-1	Other		8/11/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-02	S-202-2	Other		8/11/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-03	S-202-3	Other		8/11/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-04	B-202-1	Other		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-05	B-202-2	Other		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-06	B-202-3	Other		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-07	B-202-4	Other		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080501-08	BLANK	Other		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
Work Order: 20080501

Case Narrative

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Results relate only to the items tested and are not blank corrected unless indicated.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

ALS is an EPA recognized NLLAP laboratory for lead paint, soil, and dust wipe analyses under its AIHA-LAP accreditation.

ALS Environmental

Date: 09-Sep-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080501

Lab ID: 20080501-01A
Client Sample ID: S-202-1

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	10		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-01B
Client Sample ID: S-202-1

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	39		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-01C
Client Sample ID: S-202-1

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	4.0		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-02A
Client Sample ID: S-202-2

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	5.4		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-02B
Client Sample ID: S-202-2

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	5.4		1.0	mg/sample	1	8/21/2020

Note:

ALS Environmental

Date: 09-Sep-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080501

Lab ID: 20080501-02C
Client Sample ID: S-202-2

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

Lab ID: 20080501-03A
Client Sample ID: S-202-3

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

CONDENSABLE PARTICULATE MATTER BY EPA 202
 Condensable particulate matter-Inorg

E202
 1.0

mg/sample

1

Analyst: SRL
 8/21/2020

2.0

Lab ID: 20080501-03B
Client Sample ID: S-202-3

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

CONDENSABLE PARTICULATE MATTER BY EPA 202
 Condensable particulate matter-Orga

E202
 1.0

mg/sample

1

Analyst: SRL
 8/21/2020

13

Lab ID: 20080501-03C
Client Sample ID: S-202-3

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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Lab ID: 20080501-04A
Client Sample ID: B-202-1

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

CONDENSABLE PARTICULATE MATTER BY EPA 202
 Condensable particulate matter-Inorgani

E202
 1.0

mg/sample

1

Analyst: SRL
 8/21/2020

ND

Note:

ALS Environmental

Date: 09-Sep-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080501

Lab ID: 20080501-04B **Collection Date:** 8/13/2020
Client Sample ID: B-202-1 **Matrix:** OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Organic	13		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-04C **Collection Date:** 8/13/2020
Client Sample ID: B-202-1 **Matrix:** OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorganic	1.2		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-05A **Collection Date:** 8/13/2020
Client Sample ID: B-202-2 **Matrix:** OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Organic	4.8		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-05B **Collection Date:** 8/13/2020
Client Sample ID: B-202-2 **Matrix:** OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Organic	4.8		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-05C **Collection Date:** 8/13/2020
Client Sample ID: B-202-2 **Matrix:** OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Organic	4.8		1.0	mg/sample	1	8/21/2020

Note:

ALS Environmental

Date: 09-Sep-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080501

Lab ID: 20080501-06A
Client Sample ID: B-202-3

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	1.7		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-06B
Client Sample ID: B-202-3

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	4.8		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-06C
Client Sample ID: B-202-3

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	1.8		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-07A
Client Sample ID: B-202-4

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	12		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-07B
Client Sample ID: B-202-4

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	1.8		1.0	mg/sample	1	8/21/2020

Note:

ALS Environmental

Date: 09-Sep-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080501

Lab ID: 20080501-07C
Client Sample ID: B-202-4

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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Lab ID: 20080501-08A
Client Sample ID: BLANK

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorgani	ND		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-08B
Client Sample ID: BLANK

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orgai	1.4		1.0	mg/sample	1	8/21/2020

Lab ID: 20080501-08C
Client Sample ID: BLANK

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
----------	--------	------	--------------	-------	-----------------	---------------

Note:

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
WorkOrder: 20080501

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SDL	Sample Detection Limit
SW	SW-846 Method

<u>Units Reported</u>	<u>Description</u>
mg/sample	

ALS Environmental

Sample Receipt Checklist

Client Name: EQM-CINCINNATI

Date/Time Received: 14-Aug-20 14:34

Work Order: 20080501

Received by: JNW

Checklist completed by Jan Wilcox 14-Aug-20
eSignature Date

Reviewed by: Shawn Smythe 19-Aug-20
eSignature Date

Matrices:

Carrier name: Client

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Temperature(s)/Thermometer(s):	<input type="text"/>		
Cooler(s)/Kit(s):	<input type="text"/>		
Date/Time sample(s) sent to storage:	<input type="text"/>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<input type="text"/>		

Login Notes:

Client Contacted: _____ Date Contacted: _____ Person Contacted: _____
Contacted By: _____ Regarding: _____

Comments:

CorrectiveAction:



26-Aug-2020

Doug Allen
Environmental Quality Management
1800 Carillon Boulevard
Cincinnati, OH 45240

Re: **AK Dearborn; 050074.0221/2**

Work Order: **20080655**

Dear Doug,

ALS Environmental received 2 samples on 19-Aug-2020 03:56 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 7.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Shawn Smythe

Shawn Smythe
Project Manager

Report of Laboratory Analysis

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
Work Order: 20080655

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20080655-01	B-202-FB	Other		8/13/2020	8/19/2020 15:56	<input type="checkbox"/>
20080655-01	B-202-FB	Other		8/13/2020	8/19/2020 15:56	<input type="checkbox"/>
20080655-02	S-202-FB	Other		8/11/2020	8/19/2020 15:56	<input type="checkbox"/>
20080655-02	S-202-FB	Other		8/11/2020	8/19/2020 15:56	<input type="checkbox"/>

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
Work Order: 20080655

Case Narrative

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Results relate only to the items tested and are not blank corrected unless indicated.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

ALS is an EPA recognized NLLAP laboratory for lead paint, soil, and dust wipe analyses under its AIHA-LAP accreditation.

ALS Environmental

Date: 26-Aug-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080655

Lab ID: 20080655-01A
Client Sample ID: B-202-FB

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	1.7		1.0	mg/sample	1	8/25/2020

Lab ID: 20080655-01B
Client Sample ID: B-202-FB

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	3.8		1.0	mg/sample	1	8/25/2020

Lab ID: 20080655-01C
Client Sample ID: B-202-FB

Collection Date: 8/13/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Inorg	1.7		1.0	mg/sample	1	8/25/2020

Lab ID: 20080655-02A
Client Sample ID: S-202-FB

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	3.1		1.0	mg/sample	1	8/25/2020

Lab ID: 20080655-02B
Client Sample ID: S-202-FB

Collection Date: 8/11/2020
Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CONDENSABLE PARTICULATE MATTER BY EPA 202			E202			Analyst: SRL
Condensable particulate matter-Orga	3.1		1.0	mg/sample	1	8/25/2020

Note:

ALS Environmental

Date: 26-Aug-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2

Work Order: 20080655

Lab ID: 20080655-02C

Collection Date: 8/11/2020

Client Sample ID: S-202-FB

Matrix: OTHER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
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Note:

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221/2
WorkOrder: 20080655

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SDL	Sample Detection Limit
SW	SW-846 Method

<u>Units Reported</u>	<u>Description</u>
mg/sample	

Sample Receipt Checklist

Client Name: EQM-CINCINNATI

Date/Time Received: 19-Aug-20 15:56

Work Order: 20080655

Received by: DNS

Checklist completed by Jan Wilcox 20-Aug-20
eSignature Date

Reviewed by: Shawn Smythe 24-Aug-20
eSignature Date

Matrices:

Carrier name: Client

Shipping container/cooler in good condition? Yes No Not Present

Custody seals intact on shipping container/cooler? Yes No Not Present

Custody seals intact on sample bottles? Yes No Not Present

Chain of custody present? Yes No

Chain of custody signed when relinquished and received? Yes No

Chain of custody agrees with sample labels? Yes No

Samples in proper container/bottle? Yes No

Sample containers intact? Yes No

Sufficient sample volume for indicated test? Yes No

All samples received within holding time? Yes No

Container/Temp Blank temperature in compliance? Yes No

Sample(s) received on ice? Yes No

Temperature(s)/Thermometer(s):

Cooler(s)/Kit(s):

Date/Time sample(s) sent to storage:

Water - VOA vials have zero headspace? Yes No No VOA vials submitted

Water - pH acceptable upon receipt? Yes No N/A

pH adjusted? Yes No N/A

pH adjusted by:

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



28-Aug-2020

Doug Allen
Environmental Quality Management
1800 Carillon Boulevard
Cincinnati, OH 45240

Re: **AK Dearborn; 050074.0221**

Work Order: **20080500**

Dear Doug,

ALS Environmental received 4 samples on 14-Aug-2020 02:34 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 10.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Shawn Smythe

Shawn Smythe
Project Manager

Report of Laboratory Analysis

ALS GROUP USA, CORP Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Environmental 

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221
Work Order: 20080500

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
20080500-01	BH-1A	Air		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080500-02	BH-2A	Air		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080500-03	BH-3A	Air		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>
20080500-04	BH-4A	Air		8/13/2020	8/14/2020 14:34	<input type="checkbox"/>

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221
Work Order: 20080500

Case Narrative

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

Results relate only to the items tested and are not blank corrected unless indicated.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

ALS is an EPA recognized NLLAP laboratory for lead paint, soil, and dust wipe analyses under its AIHA-LAP accreditation.

ALS Environmental

Date: 28-Aug-20

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221
Sample ID: BH-1A
Collection Date: 8/13/2020

Work Order: 20080500
Lab ID: 20080500-01
Matrix: AIR

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ANALYTE(S) BY GAS CHROMATOGRAPHY			E18			Analyst: TSA
Methane	16		10	ppmv	1	8/20/2020

Note:

ALS Environmental

Date: 28-Aug-20

Client: Environmental Quality Management

Project: AK Dearborn; 050074.0221

Work Order: 20080500

Sample ID: BH-2A

Lab ID: 20080500-02

Collection Date: 8/13/2020

Matrix: AIR

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ANALYTE(S) BY GAS CHROMATOGRAPHY			E18			Analyst: TSA
Methane	29		10	ppmv	1	8/20/2020

Note:

ALS Environmental

Date: 28-Aug-20

Client: Environmental Quality Management

Project: AK Dearborn; 050074.0221

Work Order: 20080500

Sample ID: BH-3A

Lab ID: 20080500-03

Collection Date: 8/13/2020

Matrix: AIR

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ANALYTE(S) BY GAS CHROMATOGRAPHY			E18			Analyst: TSA
Methane	20		10	ppmv	1	8/20/2020

Note:

ALS Environmental

Date: 28-Aug-20

Client: Environmental Quality Management

Project: AK Dearborn; 050074.0221

Work Order: 20080500

Sample ID: BH-4A

Lab ID: 20080500-04

Collection Date: 8/13/2020

Matrix: AIR

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
ANALYTE(S) BY GAS CHROMATOGRAPHY			E18			Analyst: TSA
Methane	16		10	ppmv	1	8/20/2020

Note:

ALS Environmental

Date: 28-Aug-20

Client: Environmental Quality Management

QC BATCH REPORT

Work Order: 20080500

Project: AK Dearborn; 050074.0221

Batch ID: R180400 Instrument ID GC7 Method: E18

MS	Sample ID: 20080500-01AMS		Units: ppmv		Analysis Date: 8/20/2020					
Client ID: BH-1A	Run ID: GC7_200820A		SeqNo: 2299006		Prep Date:	DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Methane	59.9	10	50	0	120			0		

The following samples were analyzed in this batch:

20080500-01A	20080500-02A	20080500-03A
20080500-04A		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Environmental Quality Management
Project: AK Dearborn; 050074.0221
WorkOrder: 20080500

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SDL	Sample Detection Limit
SW	SW-846 Method

<u>Units Reported</u>	<u>Description</u>
ppmv	

ALS Environmental

Sample Receipt Checklist

Client Name: **EQM-CINCINNATI**

Date/Time Received: **14-Aug-20 14:34**

Work Order: **20080500**

Received by: **JNW**

Checklist completed by **Jan Wilcox**
eSignature

14-Aug-20
Date

Reviewed by: **Shawn Smythe**
eSignature

21-Aug-20
Date

Matrices: **air**

Carrier name: **Client**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Temperature(s)/Thermometer(s):	<input type="text"/>		
Cooler(s)/Kit(s):	<input type="text"/>		
Date/Time sample(s) sent to storage:	<input type="text"/>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<input type="text"/>		

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:

ANALYTICAL REPORT

Job Number: 140-20057-2

Job Description: AK Dearborn - Baghouse

For:
Environmental Quality Mgt., Inc.
1800 Carillon Blvd
Cincinnati, OH 45240
Attention: Doug Allen



Approved for release.
Courtney M Adkins
Project Manager II
8/28/2020 11:29 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
08/28/2020

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

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Definitions/Glossary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
L	A negative instrument reading had an absolute value greater than the reporting limit

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
▫	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Method	Method Description	Protocol	Laboratory
29/6010C	Metals (ICP), Stationary Source	EPA	TAL KNX
5	Particulates	EPA	TAL KNX
AT Prep (BH)	Preparation, Total Metals (Stationary Source)	EPA	TAL KNX
AT Prep (FH)	Preparation, Total Metals (Stationary Source)	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-20057-29	B-29-1 M5 FILTER	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-30	B-29-1 M5 ACETONE	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-31	B-29-1 M29 FH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-32	B-29-1 M29 BH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-34	B-29-2 M5 FILTER	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-35	B-29-2 M5 ACETONE	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-36	B-29-2 M29 FH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-37	B-29-2 M29 BH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-39	B-29-3 M5 FILTER	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-40	B-29-3 M5 ACETONE	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-41	B-29-3 M29 FH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-42	B-29-3 M29 BH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-44	B-29-4 M5 FILTER	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-45	B-29-4 M5 ACETONE	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-46	B-29-4 M29 FH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-47	B-29-4 M29 BH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-49	B-29-FB M5 FILTER	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-50	B-29-FB M5 ACETONE	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-51	B-29-FB M29 FH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-52	B-29-FB M29 BH	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-64	BAGHOUSE AUDIT CAT# 1425	Air	08/13/20 00:00	08/17/20 11:15	
140-20057-65	BAGHOUSE AUDIT CAT# 1426	Air	08/13/20 00:00	08/17/20 11:15	

Job Narrative 140-20057-2

Sample Receipt

The samples were received on 8/17/2020 11:15 AM; the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 20.5° C.

Receipt Exceptions

The container label for the following sample did not match the information listed on the Chain-of-Custody (COC): BLANK 8N HCL (140-20057-59). The container labels list Blank H2O, while the COC lists Blank 8N HCL. Logged per the COC.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times, and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Metals

Multi-Metals Train Preparation and Analysis

These stack gas samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0006 which is based on EPA SW-846 Method 0060, "Determination of Metals in Stack Emissions" and Method 29, "Determination of Metals Emissions from Stationary Sources". SW-846 Methods 6010C and 7470A as incorporated in Eurofins TestAmerica Knoxville standard operating procedures KNOX-MT-0007 and KNOX-MT-0009 were used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter and the acetone and nitric acid probe rinse fractions separately using HNO₃ and HF. After digestion, the HF was sequestered using H₃BO₃ followed by another heating cycle. These digestates were combined, adjusted to final volume and analyzed by ICP. A portion of the ICP digestate was prepared for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equations:

$$\text{ICP Analyte, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Final Volume ICP Digestate, L})$$

$$\text{Hg, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Final Volume ICP Digestate, L}) \times (\text{Final Volume Hg Digestate, mL} / \text{Volume ICP Digestate Used, mL})$$

The 5%HNO₃/10%H₂O₂ impinger samples were reduced in volume to 100 mL. A 20 milliliter portion of the concentrated sample was removed and processed for mercury. The remaining 80 mL of concentrated sample was digested using HNO₃ and H₂O₂, adjusted to a final volume of 80 mL, and analyzed by ICP. Results were calculated using the following equations:

$$\text{ICP Analyte, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Final Volume Concentrated Sample, L}) \times (\text{Final Volume ICP Digestate, mL} / \text{Volume Conc. Sample Digested, mL})$$

$$\text{Hg, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Final Volume Concentrated Sample, L}) \times (\text{Final Volume Hg Digestate, mL} / \text{Volume Conc. Sample Digested, mL})$$

For the 0.1N HNO₃ rinse samples (empty impingers), a 2.5 milliliter portion of the sample as received was removed and processed for mercury.

The 4% KMnO₄/10%H₂SO₄ impinger samples were filtered to remove MnO₂, followed by removal of a 25 mL portion of filtrate for mercury processing. The filtered MnO₂ residue was digested in HCl, combined with the HCl rinse sample and analyzed for mercury.

Results for the 0.1N HNO₃ rinse samples and the KMnO₄ filtrate were calculated using the following equation:

$$\text{Hg, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Total Sample Volume, L}) \times (\text{Final Volume Hg Digestate, mL} / \text{Volume Sample Digested, mL})$$

Results for the combined MnO₂ residue HCl digestates and HCl rinse samples were calculated as follows:

$$\text{Hg, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Total Sample Volume, L} + \text{MnO}_2 \text{ HCl Volume, L}) \times (\text{Final Volume Hg Digestate, mL} / \text{Volume Sample Digested, mL})$$

Note: The total sample volume for the 5%HNO₃/10%H₂O₂ impinger samples is the final volume of the concentrated sample. The total sample volume for the combined MnO₂ residue HCl digestates and HCl rinse samples is equal to the total sample volume plus the MnO₂ HCl volume.

Method 29/6010C: The following samples were diluted due to the presence of silicon which interferes with Lead: B-29-1 M29 FH (140-20057-31), B-29-2 M29 FH (140-20057-36), B-29-3 M29 FH (140-20057-41), B-29-4 M29 FH (140-20057-46), B-29-FB M29 FH (140-20057-51), (140-20057-A-36-A PDS) and (140-20057-A-36-A PDSD). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry

Total Particulates: The measurement of the mass of particulate matter trapped by the particulate filter and probe rinse derived from an M-5 sampling train was performed using SOP number KNOX-WC-0006 (based on EPA Methods 0050 and 5). Microfiber filters and 150 mL beakers are carefully inspected and tare weighed to constant weight. After sample collection, the filters are dried, and then carefully weighed to constant weight to determine the mass of particulate matter trapped on the filters. The acetone probe rinse solution is evaporated to dryness, and then weighed to constant weight to determine the total particulate mass collected in the rinse. The total particulate mass collected by an M-5 train is the sum of the particulate filter and the acetone probe rinse residue weights.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Comments

Please note that Stationary Source audit samples (ERA - Project #031720C) were received and analyzed along with the Method 29 trains. The results are reported in total μg on the final report. However, the audit provider has requested that the results be reported in different units. The final results for the audit samples were submitted electronically to ERA and are also presented following this narrative.



A Waters Company

TestAmerica Knoxville
Summary of Data Entry/Changes
For SSAS Project #031720C
(3/17/2020 - 3/16/2021)

LABORATORY INFORMATION

TestAmerica Knoxville 5815 Middlebrook Pike Knoxville, TN 37921	Customer ID: T896977 Fax: Email: courtney.adkins@testamerica.com Phone: 865-291-3019	USEPA ID: Contact: Courtney Adkins Contact Title: Approval Date: 8/28/2020
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REGULATORY AGENCY INFORMATION

You have authorized ERA to send copies of your 031720C study final reports to the following agencies:
 MI-State of MI DEQ (SSAS) Warren

THIRD PARTY INFORMATION

There are no third parties listed to receive reports.

All data points that have changed are bold and colored blue.
 All data points entered after the close of the study are indicated in red.

Metals in Impinger Solution (cat# 1426)

Analyte	Units	Reported Value	PTRL	Method Description (NELAC Code)	Analysis Date (Analyst)	Date Entered
Antimony	µg/mL		0.190			
Arsenic	µg/mL		0.150			
Barium	µg/mL		0.110			
Beryllium	µg/mL		0.0350			
Cadmium	µg/mL		0.0800			
Chromium	µg/mL		0.160			
Cobalt	µg/mL		0.0750			
Copper	µg/mL		0.150			
Lead	µg/mL	0.4619	0.150	EPA Method 29 2000 (10403722)	8/24/2020	08/28/2020
Manganese	µg/mL	2.1271	0.0750	EPA Method 29 2000 (10403722)	8/24/2020	08/28/2020
Nickel	µg/mL		0.120			
Selenium	µg/mL		0.110			
Silver	µg/mL		0.380			
Thallium	µg/mL		0.110			
Zinc	µg/mL		0.110			

Metals on Filter Paper (cat# 1425)

Analyte	Units	Reported Value	PTRL	Method Description (NELAC Code)	Analysis Date (Analyst)	Date Entered
Antimony	µg/Filter		19.0			
Arsenic	µg/Filter		15.0			
Barium	µg/Filter		15.0			
Beryllium	µg/Filter		7.50			



A Waters Company

TestAmerica Knoxville
Summary of Data Entry/Changes
For SSAS Project #031720C
(3/17/2020 - 3/16/2021)

All data points that have changed are bold and colored blue.

All data points entered after the close of the study are indicated in red.

Analyte	Units	Reported Value	PTRL	Method Description (NELAC Code)	Analysis Date (Analyst)	Date Entered
Cadmium	µg/Filter		8.00			
Chromium	µg/Filter		12.0			
Cobalt	µg/Filter		7.50			
Copper	µg/Filter		7.50			
Lead	µg/Filter	40.856	16.0	EPA Method 29 2000 (10403722)	8/27/2020	08/28/2020
Manganese	µg/Filter	41.244	7.00	EPA Method 29 2000 (10403722)	8/27/2020	08/28/2020
Nickel	µg/Filter		14.0			
Selenium	µg/Filter		14.0			
Silver	µg/Filter		21.0			
Thallium	µg/Filter		22.0			
Zinc	µg/Filter		14.0			

QC Association Summary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Metals

Prep Batch: 41998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20057-32	B-29-1 M29 BH	Total/NA	Air	AT Prep (BH)	
140-20057-37	B-29-2 M29 BH	Total/NA	Air	AT Prep (BH)	
140-20057-42	B-29-3 M29 BH	Total/NA	Air	AT Prep (BH)	
140-20057-47	B-29-4 M29 BH	Total/NA	Air	AT Prep (BH)	
140-20057-52	B-29-FB M29 BH	Total/NA	Air	AT Prep (BH)	
140-20057-65	BAGHOUSE AUDIT CAT# 1426	Total/NA	Air	AT Prep (BH)	
MB 140-41998/12-A	Method Blank	Total/NA	Air	AT Prep (BH)	
LCS 140-41998/13-A	Lab Control Sample	Total/NA	Air	AT Prep (BH)	
LCSD 140-41998/14-A	Lab Control Sample Dup	Total/NA	Air	AT Prep (BH)	

Prep Batch: 41999

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20057-31	B-29-1 M29 FH	Total/NA	Air	AT Prep (FH)	
140-20057-36	B-29-2 M29 FH	Total/NA	Air	AT Prep (FH)	
140-20057-41	B-29-3 M29 FH	Total/NA	Air	AT Prep (FH)	
140-20057-46	B-29-4 M29 FH	Total/NA	Air	AT Prep (FH)	
140-20057-51	B-29-FB M29 FH	Total/NA	Air	AT Prep (FH)	
140-20057-64	BAGHOUSE AUDIT CAT# 1425	Total/NA	Air	AT Prep (FH)	
MB 140-41999/13-A	Method Blank	Total/NA	Air	AT Prep (FH)	
LCS 140-41999/14-A	Lab Control Sample	Total/NA	Air	AT Prep (FH)	
LCSD 140-41999/15-A	Lab Control Sample Dup	Total/NA	Air	AT Prep (FH)	

Analysis Batch: 42091

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20057-32	B-29-1 M29 BH	Total/NA	Air	29/6010C	41998
140-20057-37	B-29-2 M29 BH	Total/NA	Air	29/6010C	41998
140-20057-42	B-29-3 M29 BH	Total/NA	Air	29/6010C	41998
140-20057-47	B-29-4 M29 BH	Total/NA	Air	29/6010C	41998
140-20057-52	B-29-FB M29 BH	Total/NA	Air	29/6010C	41998
140-20057-65	BAGHOUSE AUDIT CAT# 1426	Total/NA	Air	29/6010C	41998
MB 140-41998/12-A	Method Blank	Total/NA	Air	29/6010C	41998
LCS 140-41998/13-A	Lab Control Sample	Total/NA	Air	29/6010C	41998
LCSD 140-41998/14-A	Lab Control Sample Dup	Total/NA	Air	29/6010C	41998

Analysis Batch: 42236

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20057-31	B-29-1 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-31	B-29-1 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-36	B-29-2 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-36	B-29-2 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-41	B-29-3 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-41	B-29-3 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-46	B-29-4 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-46	B-29-4 M29 FH	Total/NA	Air	29/6010C	41999
140-20057-51	B-29-FB M29 FH	Total/NA	Air	29/6010C	41999
140-20057-51	B-29-FB M29 FH	Total/NA	Air	29/6010C	41999
140-20057-64	BAGHOUSE AUDIT CAT# 1425	Total/NA	Air	29/6010C	41999
MB 140-41999/13-A	Method Blank	Total/NA	Air	29/6010C	41999
LCS 140-41999/14-A	Lab Control Sample	Total/NA	Air	29/6010C	41999
LCSD 140-41999/15-A	Lab Control Sample Dup	Total/NA	Air	29/6010C	41999

QC Association Summary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

General Chemistry

Analysis Batch: 42110

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20057-29	B-29-1 M5 FILTER	Total/NA	Air	5	
140-20057-30	B-29-1 M5 ACETONE	Total/NA	Air	5	
140-20057-34	B-29-2 M5 FILTER	Total/NA	Air	5	
140-20057-35	B-29-2 M5 ACETONE	Total/NA	Air	5	
140-20057-39	B-29-3 M5 FILTER	Total/NA	Air	5	
140-20057-40	B-29-3 M5 ACETONE	Total/NA	Air	5	
140-20057-44	B-29-4 M5 FILTER	Total/NA	Air	5	
140-20057-45	B-29-4 M5 ACETONE	Total/NA	Air	5	
140-20057-49	B-29-FB M5 FILTER	Total/NA	Air	5	
140-20057-50	B-29-FB M5 ACETONE	Total/NA	Air	5	

Client Sample Results

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-1 M5 FILTER

Lab Sample ID: 140-20057-29

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	0.820		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-1 M5 ACETONE

Lab Sample ID: 140-20057-30

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Amber Glass 250ml - unpreserved

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	0.715		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-1 M29 FH

Lab Sample ID: 140-20057-31

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	L	2.00	0.940	ug/Sample		08/25/20 11:35	08/27/20 13:11	2
Manganese	2.09		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 11:24	1

Client Sample ID: B-29-1 M29 BH

Lab Sample ID: 140-20057-32

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Plastic 1 liter Wide - Unpreserved

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 11:19	1
Manganese	2.22		1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 11:19	1

Client Sample ID: B-29-2 M5 FILTER

Lab Sample ID: 140-20057-34

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	ND		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-2 M5 ACETONE

Lab Sample ID: 140-20057-35

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Amber Glass 250ml - unpreserved

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	4.74		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample Results

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-2 M29 FH

Lab Sample ID: 140-20057-36

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Petri/Filter

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	L	2.00	0.940	ug/Sample		08/25/20 11:35	08/27/20 13:16	2
Manganese	49.0		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 11:29	1

Client Sample ID: B-29-2 M29 BH

Lab Sample ID: 140-20057-37

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Plastic 1 liter Wide - Unpreserved

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 11:24	1
Manganese	1.03	J	1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 11:24	1

Client Sample ID: B-29-3 M5 FILTER

Lab Sample ID: 140-20057-39

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Petri/Filter

Matrix: Air

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	ND		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-3 M5 ACETONE

Lab Sample ID: 140-20057-40

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Amber Glass 250ml - unpreserved

Matrix: Air

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	4.21		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-3 M29 FH

Lab Sample ID: 140-20057-41

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Petri/Filter

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	L	2.00	0.940	ug/Sample		08/25/20 11:35	08/27/20 13:32	2
Manganese	85.7		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 11:44	1

Client Sample ID: B-29-3 M29 BH

Lab Sample ID: 140-20057-42

Date Collected: 08/13/20 00:00
Date Received: 08/17/20 11:15
Sample Container: Plastic 1 liter Wide - Unpreserved

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 11:54	1
Manganese	2.04		1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 11:54	1

Client Sample Results

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-4 M5 FILTER

Lab Sample ID: 140-20057-44

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	0.805		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-4 M5 ACETONE

Lab Sample ID: 140-20057-45

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Amber Glass 250ml - unpreserved

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	1.95		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-4 M29 FH

Lab Sample ID: 140-20057-46

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	L	2.00	0.940	ug/Sample		08/25/20 11:35	08/27/20 13:37	2
Manganese	25.7		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 11:49	1

Client Sample ID: B-29-4 M29 BH

Lab Sample ID: 140-20057-47

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Plastic 1 liter Wide - Unpreserved

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 11:59	1
Manganese	1.30	J	1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 11:59	1

Client Sample ID: B-29-FB M5 FILTER

Lab Sample ID: 140-20057-49

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	1.39		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample ID: B-29-FB M5 ACETONE

Lab Sample ID: 140-20057-50

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Sample Container: Amber Glass 250ml - unpreserved

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Particulates, Total	1.23		0.500	0.500	mg/sample			08/25/20 08:37	1

Client Sample Results

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-FB M29 FH

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

Lab Sample ID: 140-20057-51

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND	L	2.00	0.940	ug/Sample		08/25/20 11:35	08/27/20 13:42	2
Manganese	0.619	J	1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 12:10	1

Client Sample ID: B-29-FB M29 BH

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Sample Container: Plastic 1 liter Wide - Unpreserved

Lab Sample ID: 140-20057-52

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 12:04	1
Manganese	ND		1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 12:04	1

Client Sample ID: BAGHOUSE AUDIT CAT# 1425

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Sample Container: Petri/Filter

Lab Sample ID: 140-20057-64

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	40.9		1.00	0.470	ug/Sample		08/25/20 11:35	08/27/20 12:15	1
Manganese	41.2		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 12:15	1

Client Sample ID: BAGHOUSE AUDIT CAT# 1426

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Sample Container: Voa Vial 40ml - unpreserved

Lab Sample ID: 140-20057-65

Matrix: Air

Method: 29/6010C - Metals (ICP), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	46.2		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 12:55	1
Manganese	213		1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 12:55	1

Default Detection Limits

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Method: 29/6010C - Metals (ICP), Stationary Source

Prep: AT Prep (BH)

Analyte	RL	MDL	Units
Lead	1.00	0.480	ug/Sample
Manganese	1.50	0.180	ug/Sample

Method: 29/6010C - Metals (ICP), Stationary Source

Prep: AT Prep (FH)

Analyte	RL	MDL	Units
Lead	1.00	0.470	ug/Sample
Manganese	1.50	0.300	ug/Sample

General Chemistry

Analyte	RL	MDL	Units
Particulates, Total	0.500	0.500	mg/sample

QC Sample Results

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Method: 29/6010C - Metals (ICP), Stationary Source

Lab Sample ID: MB 140-41998/12-A
Matrix: Air
Analysis Batch: 42091

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 41998

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.480	ug/Sample		08/21/20 08:00	08/24/20 11:04	1
Manganese	ND		1.50	0.180	ug/Sample		08/21/20 08:00	08/24/20 11:04	1

Lab Sample ID: LCS 140-41998/13-A
Matrix: Air
Analysis Batch: 42091

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 41998

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	10.0	9.900		ug/Sample		99	80 - 120
Manganese	10.0	9.910		ug/Sample		99	80 - 120

Lab Sample ID: LCSD 140-41998/14-A
Matrix: Air
Analysis Batch: 42091

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 41998

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	10.0	9.801		ug/Sample		98	80 - 120	1	20
Manganese	10.0	10.02		ug/Sample		100	80 - 120	1	20

Lab Sample ID: MB 140-41999/13-A
Matrix: Air
Analysis Batch: 42236

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 41999

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.00	0.470	ug/Sample		08/25/20 11:35	08/27/20 11:08	1
Manganese	ND		1.50	0.300	ug/Sample		08/25/20 11:35	08/27/20 11:08	1

Lab Sample ID: LCS 140-41999/14-A
Matrix: Air
Analysis Batch: 42236

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 41999

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	10.0	10.24		ug/Sample		102	80 - 120
Manganese	10.0	10.26		ug/Sample		103	80 - 120

Lab Sample ID: LCSD 140-41999/15-A
Matrix: Air
Analysis Batch: 42236

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 41999

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	10.0	10.54		ug/Sample		105	80 - 120	3	20
Manganese	10.0	10.33		ug/Sample		103	80 - 120	1	20

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-1 M5 FILTER

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-29

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-1 M5 ACETONE

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-30

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-1 M29 FH

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-31

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:24	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		2			42236	08/27/20 13:11	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-1 M29 BH

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-32

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:19	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-2 M5 FILTER

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-34

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-2 M5 ACETONE

Date Collected: 08/13/20 00:00

Date Received: 08/17/20 11:15

Lab Sample ID: 140-20057-35

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-2 M29 FH

Lab Sample ID: 140-20057-36

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:29	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		2			42236	08/27/20 13:16	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-2 M29 BH

Lab Sample ID: 140-20057-37

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:24	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-3 M5 FILTER

Lab Sample ID: 140-20057-39

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-3 M5 ACETONE

Lab Sample ID: 140-20057-40

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-3 M29 FH

Lab Sample ID: 140-20057-41

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:44	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		2			42236	08/27/20 13:32	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-3 M29 BH

Lab Sample ID: 140-20057-42

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:54	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-4 M5 FILTER

Lab Sample ID: 140-20057-44

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-4 M5 ACETONE

Lab Sample ID: 140-20057-45

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-4 M29 FH

Lab Sample ID: 140-20057-46

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:49	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		2			42236	08/27/20 13:37	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-4 M29 BH

Lab Sample ID: 140-20057-47

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:59	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: B-29-FB M5 FILTER

Lab Sample ID: 140-20057-49

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-FB M5 ACETONE

Lab Sample ID: 140-20057-50

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	5		1			42110	08/25/20 08:37	TSN	TAL KNX
Instrument ID: FT_Gross										

Client Sample ID: B-29-FB M29 FH

Lab Sample ID: 140-20057-51

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 12:10	KNC	TAL KNX
Instrument ID: DUO										
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		2			42236	08/27/20 13:42	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: B-29-FB M29 BH

Lab Sample ID: 140-20057-52

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 12:04	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: BAGHOUSE AUDIT CAT# 1425

Lab Sample ID: 140-20057-64

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 12:15	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: BAGHOUSE AUDIT CAT# 1426

Lab Sample ID: 140-20057-65

Date Collected: 08/13/20 00:00

Matrix: Air

Date Received: 08/17/20 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 12:55	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Method Blank

Lab Sample ID: MB 140-41998/12-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:04	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Method Blank

Lab Sample ID: MB 140-41999/13-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:08	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-41998/13-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:09	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-41999/14-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:13	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-41998/14-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (BH)			1 Sample	100 mL	41998	08/21/20 08:00	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42091	08/24/20 11:14	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-41999/15-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	AT Prep (FH)			1 Sample	100 mL	41999	08/25/20 11:35	KNC	TAL KNX
Total/NA	Analysis	29/6010C		1			42236	08/27/20 11:19	KNC	TAL KNX
Instrument ID: DUO										

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: Environmental Quality Mgt., Inc.
Project/Site: AK Dearborn - Baghouse

Job ID: 140-20057-2

Laboratory: Eurofins TestAmerica, Knoxville

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Louisiana	NELAP	83979	06-30-21

METALS

COVER PAGE
METALS

Lab Name: Eurofins TestAmerica, Knoxville

Job Number: 140-20057-2

SDG No.: _____

Project: AK Dearborn - Baghouse

Client Sample ID	Lab Sample ID
B-29-1 M29 FH	140-20057-31
B-29-1 M29 BH	140-20057-32
B-29-2 M29 FH	140-20057-36
B-29-2 M29 BH	140-20057-37
B-29-3 M29 FH	140-20057-41
B-29-3 M29 BH	140-20057-42
B-29-4 M29 FH	140-20057-46
B-29-4 M29 BH	140-20057-47
B-29-FB M29 FH	140-20057-51
B-29-FB M29 BH	140-20057-52
BAGHOUSE AUDIT CAT# 1425	140-20057-64
BAGHOUSE AUDIT CAT# 1426	140-20057-65

Comments:

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: B-29-1 M29 FH

Lab Sample ID: 140-20057-31

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	2.00	0.940	ug/Samp le		L	2	29/6010C
7439-96-5	Manganese	2.09	1.50	0.300	ug/Samp le			1	29/6010C

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: B-29-1 M29 BH

Lab Sample ID: 140-20057-32

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	1.00	0.480	ug/Samp le			1	29/6010C
7439-96-5	Manganese	2.22	1.50	0.180	ug/Samp le			1	29/6010C

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: B-29-2 M29 FH

Lab Sample ID: 140-20057-36

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	2.00	0.940	ug/Samp le		L	2	29/6010C
7439-96-5	Manganese	49.0	1.50	0.300	ug/Samp le			1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: B-29-2 M29 BH

Lab Sample ID: 140-20057-37

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	1.00	0.480	ug/Samp le			1	29/6010C
7439-96-5	Manganese	1.03	1.50	0.180	ug/Samp le	J		1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: B-29-3 M29 FH

Lab Sample ID: 140-20057-41

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	2.00	0.940	ug/Samp le		L	2	29/6010C
7439-96-5	Manganese	85.7	1.50	0.300	ug/Samp le			1	29/6010C

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: B-29-4 M29 FH

Lab Sample ID: 140-20057-46

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	2.00	0.940	ug/Samp le		L	2	29/6010C
7439-96-5	Manganese	25.7	1.50	0.300	ug/Samp le			1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: B-29-4 M29 BH

Lab Sample ID: 140-20057-47

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.:

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	1.00	0.480	ug/Samp le			1	29/6010C
7439-96-5	Manganese	1.30	1.50	0.180	ug/Samp le	J		1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: B-29-FB M29 FH

Lab Sample ID: 140-20057-51

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	2.00	0.940	ug/Samp le		L	2	29/6010C
7439-96-5	Manganese	0.619	1.50	0.300	ug/Samp le	J		1	29/6010C

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: B-29-FB M29 BH

Lab Sample ID: 140-20057-52

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	ND	1.00	0.480	ug/Samp le			1	29/6010C
7439-96-5	Manganese	ND	1.50	0.180	ug/Samp le			1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: BAGHOUSE AUDIT CAT# 1425

Lab Sample ID: 140-20057-64

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	40.9	1.00	0.470	ug/Samp le			1	29/6010C
7439-96-5	Manganese	41.2	1.50	0.300	ug/Samp le			1	29/6010C

1A-IN
 INORGANIC ANALYSIS DATA SHEET
 METALS

Client Sample ID: BAGHOUSE AUDIT CAT# 1426

Lab Sample ID: 140-20057-65

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-20057-2

SDG ID.: _____

Matrix: Air

Date Sampled: 08/13/2020 00:00

Reporting Basis: WET

Date Received: 08/17/2020 11:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Lead	46.2	1.00	0.480	ug/Samp le			1	29/6010C
7439-96-5	Manganese	213	1.50	0.180	ug/Samp le			1	29/6010C



A Waters Company

August 28, 2020

Benjamin Fern
Environmental Quality Management
1800 Carillon Blvd.
Cincinnati, OH 45240

Enclosed is your final report for ERA's Stationary Source Audit Sample (SSAS) Program. Your final report includes an evaluation of all results submitted by your laboratory to ERA.

Data Evaluation Protocols: All analytes in ERA's SSAS Program have been evaluated comparing the reported result to the acceptance limits generated using the criteria contained in the TNI SSAS Table.

For any "Not Acceptable" results, please contact your state regulator for any corrective action requirements.

Thank you for your participation in ERA's SSAS Program. If you have any questions, please contact our Proficiency Testing Department at 1-800-372-0122.

Sincerely,

A handwritten signature in black ink, appearing to read "Matthew Seebeck", is written over a horizontal line.

Matthew Seebeck
Quality Officer

cc: Project File Number 031720C



A Waters Company

Recipient Type	Report Recipient	Contact	Project ID
Agency	MI-State of MI DEQ (SSAS) Warren 27700 Donald Court Warren, MI 48092 USA	Mark Dziadosz dsiadoszm@michigan.gov Phone: 586-753-3745	
Facility	AK Steel Dearborn Works 14661 Rotunda Drive Dearborn, MI 48120 USA	David Pate david.pate@aksteel.com Phone: 313-323-1261	
Lab	TestAmerica Knoxville 5815 Middlebrook Pike Knoxville, TN 37921 USA	Courtney Adkins courtney.adkins@testamericainc.com Phone: 865-291-3019	
Tester	Environmental Quality Management 1800 Carillon Blvd. Cincinnati, OH 45240 USA	Benjamin Fern bfern@eqm.com Phone: 513-413-6448	050074.0222





A Waters Company

031720C Laboratory Exception Report

Courtney Adkins
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
865-291-3019

EPA ID:
ERA Customer Number:

Not Reported
T896977

Not Acceptable Evaluations

There were no Not Acceptable evaluations for this study.





A Waters Company

Final Report Results For Laboratory TestAmerica Knoxville





A Waters Company

SSAP Final Evaluation Report

Project Number: **031720C**

ERA Customer Number: **T896977**

Laboratory Name: **TestAmerica Knoxville**

Inorganic Results





031720C Evaluation Final Complete Report

A Waters Company

Courtney Adkins
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
865-291-3019

EPA ID:
ERA Customer Number:

Not Reported
T896977

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals in Impinger Solution (cat# 1426, lot# 031720C) Study Dates: 03/17/20 - 08/28/20									
1005	Antimony	µg/mL		2.55	1.91 - 3.19	Not Reported			
1010	Arsenic	µg/mL		2.79	2.09 - 3.49	Not Reported			
1015	Barium	µg/mL		2.83	2.12 - 3.54	Not Reported			
1020	Beryllium	µg/mL		1.98	1.48 - 2.48	Not Reported			
1030	Cadmium	µg/mL		1.06	0.848 - 1.27	Not Reported			
1040	Chromium	µg/mL		1.30	1.04 - 1.56	Not Reported			
1050	Cobalt	µg/mL		0.314	0.236 - 0.392	Not Reported			
1055	Copper	µg/mL		1.46	1.10 - 1.82	Not Reported			
1075	Lead	µg/mL	0.4619	0.461	0.346 - 0.576	Acceptable	EPA Method 23 2000	8/24/2020	
1090	Manganese	µg/mL	2.1271	2.08	1.56 - 2.60	Acceptable	EPA Method 23 2000	8/24/2020	
1105	Nickel	µg/mL		1.80	1.44 - 2.16	Not Reported			
1140	Selenium	µg/mL		2.42	1.82 - 3.02	Not Reported			
1150	Silver	µg/mL		2.17	1.63 - 2.71	Not Reported			
1165	Thallium	µg/mL		1.45	1.09 - 1.81	Not Reported			
1190	Zinc	µg/mL		2.35	1.76 - 2.94	Not Reported			





A Waters Company

Courtney Adkins
TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
865-291-3019

EPA ID:
ERA Customer Number:

Not Reported
T896977

031720C Evaluation Final Complete Report

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals on Filter Paper (cat# 1425, lot# 031720C) Study Dates: 03/17/20 - 08/28/20									
1005	Antimony	µg/Filter		36.6	27.4 - 45.8	Not Reported			
1010	Arsenic	µg/Filter		47.8	35.8 - 59.8	Not Reported			
1015	Barium	µg/Filter		44.0	33.0 - 55.0	Not Reported			
1020	Beryllium	µg/Filter		26.5	19.9 - 33.1	Not Reported			
1030	Cadmium	µg/Filter		47.8	38.2 - 57.4	Not Reported			
1040	Chromium	µg/Filter		30.1	24.1 - 36.1	Not Reported			
1050	Cobalt	µg/Filter		47.1	35.3 - 58.9	Not Reported			
1055	Copper	µg/Filter		43.5	32.6 - 54.4	Not Reported			
1075	Lead	µg/Filter	40.856	40.8	32.6 - 49.0	Acceptable	EPA Method 29 2000	8/27/2020	
1090	Manganese	µg/Filter	41.244	38.4	30.7 - 46.1	Acceptable	EPA Method 29 2000	8/27/2020	
1105	Nickel	µg/Filter		41.2	33.0 - 49.4	Not Reported			
1140	Selenium	µg/Filter		40.2	30.2 - 50.2	Not Reported			
1150	Silver	µg/Filter		45.2	31.6 - 58.8	Not Reported			
1165	Thallium	µg/Filter		33.7	25.3 - 42.1	Not Reported			
1190	Zinc	µg/Filter		43.8	32.8 - 54.8	Not Reported			



APPENDIX D

QA/QC DATA

CALIBRATION PROCEDURES AND RESULTS

All of the equipment used is calibrated in accordance with the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III* (EPA-600/4-77-027b). The following pages describe these procedures and include the data sheets.

DRY GAS METER AND ORIFICE METER

Dry gas meters and orifices are calibrated in accordance with Section 3.3.2 of the QA Handbook. This procedure involves direct comparison of the dry gas meter to a reference dry test meter. The reference dry test meter is routinely calibrated using a liquid displacement technique. Before its initial use in the field, the metering system is calibrated over the entire range of operation. After each field use, the metering system is calibrated at a single intermediate setting based on the previous field test. Acceptable tolerances for the initial and final gas meter factors and orifice calibration factors are $Y \pm 0.02$ and $\Delta H \pm 0.015$ from average, respectively.

ENVIRONMENTAL QUALITY MANAGEMENT

Meter Box: 6 Bar. Press.(Pb): 29.08 in. Hg
 Date: August 26, 2020 Pretest Gamma: 0.996
 Calibrated By : JG Pretest dH@: 1.932
 Plant: AK Dearborn

		RUN 1	RUN 2	RUN 3
DH	Delta H	3.00	2.00	3.00
in Hg	Vacuum	7.00	7.00	7.00
Vw ₁	Initial RTM	584.415	608.276	632.657
Vw ₂	Final RTM	608.276	632.657	655.343
Vd ₁	Initial DGM	613.756	637.762	662.432
Vd ₂	Final DGM	637.762	662.432	685.513
Tw	Ave. Temp RTM °F	68.0	68.0	68.0
Td	Ave. Temp DGM °F	71.0	76.0	80.0
t	Time (min.)	26.0	27.0	25.0

Vw ₂ - Vw ₁	Net Volume RTM	23.861	24.381	22.686
Vd ₂ - Vd ₁	Net Volume DGM	24.006	24.670	23.081
	Y	0.992	0.998	0.998
	dH@	2.039	1.391	2.050

AVERAGE Y = **0.992**

% Difference from Yearly Y = **-0.352**

ACCEPT

AVERAGE dH@ = **1.827**

Calculations

$$Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw + 460))$$

$$dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw + 460) * time) / Vw)^2$$

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.: 6 Bar. Press.(Pb): 30.09 in. Hg
 Date: 6/18/2020 Calibrated By: BF

		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
DH	Delta H	0.50	0.75	1.00	1.50	2.00	4.00
in Hg	Vacuum	10	10	10	10	10	10
Vw ₁	Initial RTM	144.854	156.358	171.329	187.252	206.139	228.384
Vw ₂	Final RTM	156.066	170.959	186.920	205.885	227.751	259.085
Vd ₁	Initial DGM	795.911	807.440	822.469	838.483	857.512	880.002
Vd ₂	Final DGM	807.142	822.099	838.141	857.258	879.362	911.141
Tw	Ave. Temp RTM °F	69	70	70	70	70	70
Td	Ave. Temp DGM °F	71	73	75	76	77	80
t	Time (min.)	29.0	31.0	29.0	29.0	29.0	29.0

Vw ₂ - Vw ₁	Net Volume RTM	11.212	14.601	15.591	18.633	21.612	30.701	
Vd ₂ - Vd ₁	Net Volume DGM	11.231	14.659	15.672	18.775	21.850	31.139	
	Y	1.001	1.001	1.002	1.000	0.997	0.994	
	dH@	1.857	1.874	1.912	2.006	1.984	1.958	
AVERAGE Y =		0.996	(Reference meter correction factor of 0.9965)					ACCEPT
Average Y Range =			0.976	TO	1.016			
AVERAGE dH@ =		1.932						ACCEPT
Average dH@ Range =			1.732	TO	2.132			
Calculations								
$Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw + 460))$ $dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw + 460) * t) / Vw)^2$								

ENVIRONMENTAL QUALITY MANAGEMENT

Meter Box: 11 Bar. Press.(Pb): 29.08 in. Hg
 Date: August 26, 2020 Pretest Gamma: 1.023
 Calibrated By : JG Pretest dH@: 1.767

Plant: AK Dearborn

		RUN 1	RUN 2	RUN 3
DH	Delta H	2.80	2.80	2.80
in Hg	Vacuum	5.00	5.00	5.00
Vw ₁	Initial RTM	424.615	442.886	464.582
Vw ₂	Final RTM	442.886	464.582	482.785
Vd ₁	Initial DGM	772.285	790.518	812.353
Vd ₂	Final DGM	790.518	812.353	830.774
Tw	Ave. Temp RTM °F	67.0	69.0	74.0
Td	Ave. Temp DGM °F	71.0	79.0	84.0
t	Time (min.)	20.0	24.0	20.0

Vw ₂ - Vw ₁	Net Volume RTM	18.271	21.696	18.203
Vd ₂ - Vd ₁	Net Volume DGM	18.233	21.835	18.421
	Y	1.003	1.005	1.000
	dH@	1.913	1.939	1.931

AVERAGE Y = **1.004**

% Difference from Yearly Y = **-1.867**

ACCEPT

AVERAGE dH@ = **1.928**

Calculations

$$Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw + 460))$$

$$dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw + 460) * time) / Vw)^2$$

ENVIRONMENTAL QUALITY MANAGEMENT

Box No.: 11 Bar. Press.(Pb): 29.82 in. Hg
 Date: 1/2/2020 Calibrated By: EZ

		RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
DH	Delta H	0.50	0.75	1.00	1.50	2.00	4.00
in Hg	Vacuum	10	10	10	10	10	10
Vw ₁	Initial RTM	379.037	391.204	401.823	416.858	432.983	451.211
Vw ₂	Final RTM	390.923	401.404	416.467	432.601	450.339	474.515
Vd ₁	Initial DGM	891.808	903.847	914.352	929.234	945.236	963.353
Vd ₂	Final DGM	903.577	913.947	928.852	944.858	962.487	986.489
Tw	Ave. Temp RTM °F	69	70	72	73	74	74
Td	Ave. Temp DGM °F	72	76	80	83	86	89
t	Time (min.)	29.5	21.0	26.0	23.0	22.0	21.0

Vw ₂ - Vw ₁	Net Volume RTM	11.886	10.200	14.644	15.743	17.356	23.304	
Vd ₂ - Vd ₁	Net Volume DGM	11.769	10.100	14.500	15.624	17.251	23.136	
	Y	1.015	1.019	1.023	1.024	1.024	1.025	
	dH@	1.719	1.771	1.755	1.777	1.782	1.795	
AVERAGE Y =		1.023	(Reference meter correction factor of 1.0014)					ACCEPT
Average Y Range =			1.003	TO	1.043			
AVERAGE dH@ =		1.767						ACCEPT
Average dH@ Range =			1.567	TO	1.967			
Calculations								
$Y = (Vw * Pb * (Td + 460)) / (Vd * (Pb + (dHd / 13.6)) * (Tw + 460))$ $dH@ = 0.0317 * dHd / (Pb (Td + 460)) * (((Tw + 460) * t) / Vw)^2$								

DIGITAL INDICATORS FOR THERMOCOUPLE READOUT

A digital indicator is calibrated by feeding a series of millivolt signals to the input and comparing the indicator reading with the reading the signal should have generated. Errors did not exceed 0.5 percent when the temperatures were expressed in degrees Rankine. Calibration data are included in the following Thermocouple Digital Indicator Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR CALIBRATION DATA SHEET

DATE: 19-Dec-19 INDICATOR NO.: CL-300-2100F
OPERATOR: EZ SERIAL NO.: 507
CALIBRATION DEVICE: Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGNAL	EQUIVALENT TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	0	0	0	0.0
2	100	100	98	0.4
3	200	200	200	0.0
4	300	300	299	0.1
5	400	400	397	0.3
6	500	500	497	0.3
7	1000	1000	1003	0.2
8	1300	1300	1301	0.1
9	1600	1600	1605	0.2
10	1900	1900	1904	0.2

Percent difference must be less than or equal to 0.5 %

Percent difference:
$$\frac{(\text{Equivalent Temp., } ^\circ\text{R} - \text{Digital Indicator Temp., } ^\circ\text{R}) * (100\%)}{(\text{Equivalent Temp., } ^\circ\text{R})}$$

Where $^\circ\text{R} = ^\circ\text{F} + 460$

ACCEPT

ENVIRONMENTAL QUALITY MANAGEMENT

THERMOCOUPLE DIGITAL INDICATOR CALIBRATION DATA SHEET

DATE: 19-Dec-19 INDICATOR NO.: CL-300-2100F
OPERATOR: EZ SERIAL NO.: 507
CALIBRATION DEVICE: Thermocouple Simulator MANUFACTURER: Omega

TEST POINT NO.	MILLIVOLT SIGNAL	EQUIVALENT TEMP, °F	DIGITAL INDICATOR TEMP READING, °F	DIFFERENCE, %
1	0	0	0	0.0
2	100	100	98	0.4
3	200	200	200	0.0
4	300	300	298	0.3
5	400	400	397	0.3
6	500	500	497	0.3
7	1000	1000	1002	0.1
8	1300	1300	1300	0.0
9	1600	1600	1603	0.1
10	1900	1900	1898	0.1

Percent difference must be less than or equal to 0.5 %

Percent difference:
$$\frac{(\text{Equivalent Temp., } ^\circ\text{R} - \text{Digital Indicator Temp., } ^\circ\text{R}) * (100\%)}{(\text{Equivalent Temp., } ^\circ\text{R})}$$

Where $^\circ\text{R} = ^\circ\text{F} + 460$

ACCEPT

DRY GAS THERMOCOUPLES AND IMPINGER THERMOCOUPLES

The dry gas thermocouples are calibrated by comparing them with an ASTM-3 thermometer at approximately 32°F, ambient temperature, and a higher temperature between approximately 100°F and 200°F. The thermocouples agreed within 5°F of the reference thermometer. The impinger thermocouples are checked in a similar manner at approximately 32°F and ambient temperature, and they agreed within 2°F. The thermocouples may be checked at ambient temperature prior to the test series to verify calibration. Calibration data are included in the following Dry Gas Thermometer and Impinger Thermocouple Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 19-Dec-19

THERMOCOUPLE NUMBER: MB-6

AMBIENT TEMPERATURE: 60 °F

BAROMETRIC PRES.(In.Hg): 30.50

CALIBRATOR: EZ

Reference point number	Source ^a (Specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference, ^b °F
Inlet				
1	Ambient Air	63	64	1
2	Cold Bath	32	35	3
3	Hot Bath	212	212	0
Outlet				
1	Ambient Air	63	64	1
2	Cold Bath	32	34	2
3	Hot Bath	212	214	2

^aType of calibration used.

ACCEPT

^bAllowable tolerance $\pm 5^{\circ}\text{F}$

Comments:

ENVIRONMENTAL QUALITY MANAGEMENT

TEMPERATURE SENSOR CALIBRATION DATA FORM FOR METER BOX

DATE: 19-Dec-19

THERMOCOUPLE NUMBER: MB-11

AMBIENT TEMPERATURE: 60 °F

BAROMETRIC PRES.(In.Hg): 30.50

CALIBRATOR: EZ

Reference point number	Source ^a (Specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference, ^b °F
Inlet				
1	Ambient Air	60	64	4
2	Cold Bath	32	34	2
3	Hot Bath	212	213	1
Outlet				
1	Ambient Air	60	63	3
2	Cold Bath	32	34	2
3	Hot Bath	212	213	1

^aType of calibration used.

ACCEPT

^bAllowable tolerance $\pm 5^{\circ}\text{F}$

Comments:

**TEMPERATURE SENSOR CALIBRATION DATA FORM
FOR SAMPLE HEADS**

12/26/2019

Reference point number	Source ^a (Specify)	Reference Thermometer Temperature, °F	Thermocouple Potentiometer Temperature, °F	Temperature Difference, ^b °F	
Sample Head No. 1					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 2					
1	Ambient Air	65	67	2	ACCEPT
2	Cold Bath	32	32	0	
Sample Head No. 3					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 4					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 5					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 6					
1	Ambient Air	63	65	2	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 8					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 9					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	32	0	
Sample Head No. 10					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 11					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	32	0	
Sample Head No. 12					
1	Ambient Air	65	67	2	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 13					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 14					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 15					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	

Sample Head No. 16					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 17					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 18					
1	Ambient Air	65	67	2	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 19					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 20					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 21					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 22					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	0	
Sample Head No. 23					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	0	
Sample Head No. 24					
1	Ambient Air	65	67	2	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 25					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 26					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 27					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 28					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 29					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 30					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 31					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 32					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	33	1	

Sample Head No. 33					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 34					
1	Ambient Air	65	64	1	ACCEPT
2	Cold Bath	32	33	1	
Sample Head No. 35					
1	Ambient Air	65	66	1	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 36					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	34	2	
Sample Head No. 37					
1	Ambient Air	65	65	0	ACCEPT
2	Cold Bath	32	33	1	

^aType of calibration used.

^bAllowable tolerance $\pm 2^{\circ}\text{F}$

Calibrated By: EZ

STACK THERMOCOUPLES

Each thermocouple is calibrated by comparing it with an ASTM-3F thermometer at approximately 32°F, ambient temperature, 212°F, and 500°F. The thermocouple reads within 1.5 percent of the reference thermometer throughout the entire range when expressed in degrees Rankine. The thermocouples may be checked at ambient temperature at the test site to verify the calibration. Calibration data are included in the following Thermocouple Calibration Data Sheet(s).

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff. %	Cold Bath	Diff. %	Hot Bath	Diff. %	HOT OIL	Diff. %	Accept/Reject
MP2-1	Reference	12/19/2019	64	0.21	32	0.28	212	0.13	400	0.15	ACCEPT
	Pitot		62.9		33.4		211.1		401.3		
MP3-1	Reference	12/19/2019	64	0.19	32	0.24	212	0.03	400	0.30	ACCEPT
	Pitot		65		33.2		211.8		397.4		
MP4-1	Reference	12/19/2019	64	0.17	32	0.20	212	0.10	400	0.42	ACCEPT
	Pitot		63.1		33		211.3		396.4		
T1-1	Reference	12/19/2019	64	0.15	32	0.16	212	0.13	400	0.28	ACCEPT
	Pitot		63.2		32.8		211.1		397.6		
T1-2	Reference	12/19/2019	64	0.06	32	0.14	212	0.19	400	0.22	ACCEPT
	Pitot		63.7		32.7		210.7		398.1		
T2-1	Reference	12/19/2019	64	0.11	32	0.18	212	0.09	400	0.09	ACCEPT
	Pitot		63.4		32.9		211.4		399.2		
P2-2	Reference	12/19/2019	64	0.00	32	0.08	212	0.19	400	0.10	ACCEPT
	Pitot		64		32.4		210.7		399.1		
T2-2	Reference	12/19/2019	64	0.27	32	0.16	212	0.04	400	0.22	ACCEPT
	Pitot		62.6		32.8		211.7		398.1		
T2-3	Reference	12/19/2019	64	0.06	32	0.20	212	0.19	400	0.83	ACCEPT
	Pitot		63.7		33		210.7		392.9		
T2-4	Reference	12/19/2019	64	0.19	32	0.16	212	0.09	400	0.05	ACCEPT
	Pitot		63		32.8		211.4		399.6		
T2-5	Reference	12/19/2019	64	0.06	32	0.16	212	0.07	400	0.41	ACCEPT
	Pitot		64.3		32.8		211.5		403.5		
T2-6	Reference	12/19/2019	64	0.15	32	0.37	212	0.09	400	0.08	ACCEPT
	Pitot		63.2		33.8		211.4		400.7		
T2-7	Reference	12/19/2019	64	0.15	32	0.28	212	0.28	400	1.20	ACCEPT
	Pitot		63.2		33.4		210.1		389.7		
T2-8	Reference	12/19/2019	64	0.27	32	0.28	212	0.24	400	0.85	ACCEPT
	Pitot		62.6		33.4		210.4		392.7		
T2-9I	Reference	12/19/2019	64	0.15	32	0.22	212	0.10	400	0.31	ACCEPT
	Pitot		63.2		33.1		211.3		402.7		
T2-10	Reference	12/19/2019	64	0.23	32	0.22	212	0.10	400	0.19	ACCEPT
	Pitot		62.8		33.1		211.3		398.4		
T2-11	Reference	12/19/2019	64	0.11	32	0.39	212	0.22	400	0.31	ACCEPT
	Pitot		63.4		33.9		210.5		402.7		
T2-12	Reference	12/19/2019	64	0.00	32	0.22	212	0.18	400	0.30	ACCEPT
	Pitot		64		33.1		210.8		397.4		
T2-13	Reference	12/19/2019	64	0.08	32	0.00	212	0.19	400	0.22	ACCEPT
	Pitot		63.6		32		210.7		398.1		
T2-14	Reference	12/19/2019	64	0.02	32	0.00	212	0.13	400	0.28	ACCEPT
	Pitot		64.1		32		211.1		397.6		
T2-15	Reference	12/19/2019	64	0.08	32	0.28	212	0.10	400	0.14	ACCEPT
	Pitot		64.4		33.4		211.3		401.2		
T2-16	Reference	12/19/2019	64	0.25	32	0.28	212	0.15	400	0.19	ACCEPT
	Pitot		62.7		33.4		211		398.4		
T2-18	Reference	12/19/2019	63	0.10	32	0.14	212	0.09	400	0.30	ACCEPT
	Pitot		63.5		32.7		211.4		397.4		
T2-20	Reference	12/19/2019	64	0.04	32	0.16	212	0.19	400	0.52	ACCEPT
	Pitot		64.2		32.8		210.7		395.5		
T3-1	Reference	12/20/2019	63	0.10	32	0.35	212	0.09	400	0.38	ACCEPT
	Pitot		62.5		33.7		211.4		396.7		
T3-2	Reference	12/20/2019	63	0.15	32	0.00	212	0.09	400	0.30	ACCEPT
	Pitot		63.8		32		211.4		397.4		
T3-3P	Reference	12/19/2019	64	0.15	32	0.00	212	0.25	400	0.33	ACCEPT
	Pitot		63.2		32		210.3		397.2		
T3-4P	Reference	12/20/2019	63	0.08	32	0.08	212	0.10	400	0.15	ACCEPT
	Pitot		63.4		32.4		211.3		398.7		
T3-5	Reference	12/20/2019	63	0.00	32	0.00	212	0.16	400	0.00	ACCEPT
	Pitot		63		32		210.9		400		
T3-6	Reference	12/20/2019	63	0.00	32	0.43	212	0.16	400	0.35	ACCEPT
	Pitot		63		34.1		210.9		397		
T3-7	Reference	12/20/2019	63	0.19	32	0.00	212	0.13	400	0.67	ACCEPT
	Pitot		64		32		211.1		394.2		
T3-8	Reference	12/19/2019	64	0.11	32	0.14	212	0.00	400	0.31	ACCEPT
	Pitot		63.4		32.7		212		402.7		

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff., %	Cold Bath	Diff., %	Hot Bath	Diff., %	HOT OIL	Diff., %	Accept/Reject
T3-9I	Reference	12/19/2019	64	0.00	32	0.22	212	0.24	400	0.10	ACCEPT
	Pitot		64		33.1		210.4		399.1		
T3-10I	Reference	12/19/2019	64	0.00	32	0.41	212	0.45	402	0.23	ACCEPT
	Pitot		64		30		209		400		
T3-11	Reference	12/19/2019	64	0.02	32	0.28	212	0.10	400	0.19	ACCEPT
	Pitot		64.1		33.4		211.3		398.4		
T3-11I	Reference	12/19/2019	64	0.15	32	0.06	212	0.09	400	0.30	ACCEPT
	Pitot		63.2		31.7		211.4		397.4		
T3-12	Reference	12/20/2019	63	0.19	32	0.24	212	0.22	400	0.08	ACCEPT
	Pitot		64		33.2		210.5		400.7		
T3-13	Reference	12/20/2019	63	0.19	32	0.22	212	0.25	400	0.30	ACCEPT
	pitot		62		33.1		210.3		397.4		
T3-14	Reference	12/20/2019	63	0.19	32	0.16	212	0.19	400	0.12	ACCEPT
	Pitot		64		32.8		210.7		399		
T3-16	Reference	12/20/2019	63	0.00	32	0.20	212	0.09	400	0.03	ACCEPT
	pitot		63		33		211.4		399.7		
T3-17	Reference	12/20/2019	63	0.19	32	0.28	212	0.04	400	0.21	ACCEPT
	Pitot		64		33.4		211.7		398.2		
T3-19	Reference	12/20/2019	63	0.19	32	0.24	212	0.01	400	0.62	ACCEPT
	pitot		64		33.2		212.1		394.7		
T3-20	Reference	12/20/2019	63	0.13	32	0.12	212	0.09	400	0.00	ACCEPT
	Pitot		63.7		32.6		211.4		400		
T3-21	Reference	12/19/2019	64	0.06	32	0.14	212	0.09	400	0.21	ACCEPT
	Pitot		64.3		32.7		211.4		398.2		
T3-22	Reference	12/19/2019	64	0.19	32	0.24	212	0.04	400	0.65	ACCEPT
	Pitot		63		33.2		211.7		394.4		
T3-23	Reference	12/30/2019	66	0.19	34	0.00	210	0.15	360	0.00	ACCEPT
	Pitot		65		34		209		360		
T3-24P	Reference	12/20/2019	63	0.00	32	0.45	212	0.01	400	0.15	ACCEPT
	Pitot		63		34.2		212.1		401.3		
T3-25	Reference	12/20/2019	63	0.00	32	0.43	212	0.16	400	0.31	ACCEPT
	Pitot		63		34.1		210.9		397.3		
T4-1	Reference	12/20/2019	63	0.02	32	0.00	212	0.09	400	0.01	ACCEPT
	Pitot		63.1		32		211.4		399.9		
T4-3	Reference	12/20/2019	63	0.10	32	0.08	212	0.10	400	0.28	ACCEPT
	Pitot		63.5		32.4		211.3		402.4		
T4-4P	Reference	12/20/2019	63	0.15	32	0.22	212	0.09	400	0.20	ACCEPT
	Pitot		63.8		33.1		211.4		398.3		
T4-5	Reference	12/20/2019	63	0.15	32	0.22	212	0.09	400	0.28	ACCEPT
	Pitot		63.8		33.1		211.4		397.6		
T4-6P	Reference	12/20/2019	63	0.11	32	0.04	212	0.07	400	0.31	ACCEPT
	Pitot		63.6		32.2		211.5		397.3		
T4-7	Reference	12/20/2019	63	0.11	32	0.06	212	0.00	400	0.44	ACCEPT
	Pitot		63.6		32.3		212		396.2		
T4-8	Reference	12/23/2019	63	0.00	32	0.28	212	0.19	400	0.50	ACCEPT
	Pitot		63		33.4		210.7		395.7		
T4-8P	Reference	12/20/2019	63	0.13	32	0.10	212	0.07	400	0.52	ACCEPT
	Pitot		63.7		32.5		211.5		395.5		
T4-10	Reference	12/20/2019	63	0.04	32	0.28	212	0.16	400	0.30	ACCEPT
	Pitot		63.2		33.4		210.9		397.4		
T4-13	Reference	12/20/2019	63	0.17	32	0.22	212	0.09	400	0.30	ACCEPT
	Pitot		62.1		33.1		211.4		397.4		
T4-14	Reference	12/20/2019	63	0.04	32	0.22	212	0.00	400	0.09	ACCEPT
	Pitot		63.2		33.1		212		399.2		
T4-16	Reference	12/20/2019	63	0.13	32	0.22	212	0.04	400	0.08	ACCEPT
	Pitot		63.7		33.1		211.7		400.7		
T4-17	Reference	12/23/2019	63	0.00	32	0.18	212	0.01	400	0.33	ACCEPT
	Pitot		63		32.9		211.9		397.2		
T4-19	Reference	12/20/2019	63	0.00	32	0.16	212	0.09	400	0.30	ACCEPT
	pitot		63		32.8		211.4		397.4		
T4-20	Reference	12/23/2019	63	0.00	32	0.16	212	0.09	400	0.34	ACCEPT
	Pitot		63		32.8		211.4		397.1		
T4-21	Reference	12/23/2019	63	0.00	32	0.22	212	0.07	400	0.66	ACCEPT
	Pitot		63		33.1		211.5		394.3		
T4-22	Reference	12/23/2019	63	0.00	32	0.14	212	0.19	400	0.09	ACCEPT
	Pitot		63		32.7		210.7		400.8		
T4-23	Reference	12/23/2019	63	0.00	32	0.16	212	0.21	400	0.30	ACCEPT
	pitot		63		32.8		210.6		397.4		
T4-24	Reference	12/23/2019	63	0.00	32	0.08	212	0.01	400	0.26	ACCEPT
	Pitot		63		32.4		211.9		397.8		
T4-25	Reference	12/23/2019	63	0.00	32	0.14	212	0.25	400	0.31	ACCEPT
	pitot		63		32.7		210.3		402.7		

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff. %	Cold Bath	Diff. %	Hot Bath	Diff. %	HOT OIL	Diff. %	Accept/Reject
T4-26	Reference	12/23/2019	63	0.00	32	0.14	212	0.12	400	0.30	ACCEPT
	Pitot		63		32.7		211.2		397.4		
T4-27	Reference	12/30/2019	66	0.00	34	0.00	210	0.00	378	0.00	ACCEPT
	Pitot		66		34		210		378		
T4-28	Reference	12/20/2019	63	0.00	32	0.28	212	0.24	400	0.02	ACCEPT
	Pitot		63		33.4		210.4		400.2		
T5-2	Reference	12/30/2019	65	0.19	34	0.40	210	0.30	380	0.24	ACCEPT
	Pitot		66		36		208		378		
T5-3P	Reference	12/30/2019	66	0.00	34	0.00	210	0.15	375	0.12	ACCEPT
	Pitot		66		34		209		376		
T5-4	Reference	12/30/2019	66	0.00	34	0.00	212	0.15	373	0.00	ACCEPT
	Pitot		66		34		211		373		
T5-7P	Reference	12/30/2019	66	0.19	34	0.00	211	0.15	378	0.36	ACCEPT
	Pitot		67		34		210		375		
T5-8	Reference	12/30/2019	65	0.19	34	0.40	212	0.30	384	0.24	ACCEPT
	Pitot		66		36		210		382		
T5-9	Reference	12/30/2019	66	0.00	32	0.20	211	0.00	372	0.12	ACCEPT
	Pitot		66		33		211		373		
T5-10	Reference	12/30/2019	66	0.00	33	0.00	212	0.00	374	0.00	ACCEPT
	Pitot		66		33		212		374		
T5-11	Reference	12/30/2019	66	0.00	34	0.00	212	0.15	370	0.12	ACCEPT
	Pitot		66		34		211		371		
T5-12	Reference	12/30/2019	66	0.19	34	0.20	210	0.15	360	0.12	ACCEPT
	Pitot		67		33		211		361		
T5-13	Reference	12/30/2019	66	0.19	34	0.20	210	0.00	360	0.24	ACCEPT
	Pitot		65		33		210		358		
T5-14	Reference	12/30/2019	65	0.38	34	0.40	210	0.30	380	0.24	ACCEPT
	Pitot		67		36		208		378		
T5-15	Reference	12/30/2019	66	0.19	34	0.40	212	0.30	370	0.24	ACCEPT
	Pitot		67		36		210		372		
T5-16	Reference	12/30/2019	65	0.00	33	0.00	212	0.00	372	0.00	ACCEPT
	Pitot		65		33		212		372		
T5-17	Reference	12/30/2019	66	0.00	34	0.00	212	0.15	370	0.00	ACCEPT
	Pitot		66		34		211		370		
T6-1	Reference	12/30/2019	66	0.00	34	0.00	211	0.00	370	0.24	ACCEPT
	Pitot		66		34		211		368		
T6-2	Reference	12/30/2019	66	0.00	34	0.00	211	0.15	372	0.12	ACCEPT
	Pitot		66		34		210		371		
T6-3	Reference	12/30/2019	66	0.00	33	0.00	211	0.15	376	0.12	ACCEPT
	Pitot		66		33		210		375		
T6-3P	Reference	12/30/2019	65	0.19	34	0.40	212	0.30	360	0.24	ACCEPT
	Pitot		66		36		210		358		
T6-5	Reference	12/30/2019	66	0.19	33	0.00	210	0.15	379	0.00	ACCEPT
	Pitot		65		33		211		379		
T6-5P	Reference	12/30/2019	65	0.19	34	0.20	212	0.15	370	0.24	ACCEPT
	Pitot		66		35		211		368		
T6-7	Reference	12/30/2019	65	0.00	33	0.20	211	0.15	370	0.24	ACCEPT
	Pitot		65		34		210		368		
T6-9	Reference	12/30/2019	65	0.00	32	0.41	212	0.30	400	0.35	ACCEPT
	Pitot		65		34		210		397		
T6-10	Reference	12/30/2019	65	0.19	34	0.20	211	0.15	374	0.24	ACCEPT
	Pitot		66		35		210		372		
T6-12P	Reference	12/30/2019	66	0.00	34	0.00	210	0.15	370	0.24	ACCEPT
	Pitot		66		34		211		368		
T6-13	Reference	12/30/2019	66	0.00	34	0.00	212	0.15	371	0.12	ACCEPT
	Pitot		66		34		211		370		
T6-14P	Reference	12/30/2019	66	0.00	34	0.00	210	0.15	373	0.12	ACCEPT
	Pitot		66		34		211		374		
T6-15P	Reference	12/30/2019	65	0.00	33	0.00	210	0.00	374	0.12	ACCEPT
	Pitot		65		33		210		373		
T6-16	Reference	12/30/2019	65	0.19	34	0.20	210	0.15	370	0.24	ACCEPT
	Pitot		66		33		211		372		
T6-17	Reference	12/30/2019	65	0.19	34	0.20	210	0.15	372	0.24	ACCEPT
	Pitot		66		35		209		370		
T6-18	Reference	12/30/2019	65	0.19	34	0.00	210	0.15	372	0.12	ACCEPT
	Pitot		66		34		211		371		
T6-20	Reference	12/30/2019	66	0.00	34	0.00	210	0.00	370	0.24	ACCEPT
	Pitot		66		34		210		368		
T7-1	Reference	12/31/2019	65	0.38	32	0.41	210	0.45	365	0.24	ACCEPT
	Pitot		67		34		207		363		

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff. %	Cold Bath	Diff. %	Hot Bath	Diff. %	HOT OIL	Diff. %	Accept/Reject
T7-2	Reference	12/30/2109	66	0.00	33	0.00	210	0.15	380	0.00	ACCEPT
	Pitot		66		33		211		380		
T7-2P	Reference	12/31/2019	65	0.19	32	0.20	212	0.15	390	0.24	ACCEPT
	Pitot		66		33		211		388		
T7-5	Reference	12/30/2019	66	0.00	33	0.00	211	0.15	381	0.00	ACCEPT
	Pitot		66		33		212		381		
T7-7	Reference	12/31/2019	65	0.19	32	0.41	210	0.15	365	0.24	ACCEPT
	Pitot		66		34		209		363		
T7-8	Reference	12/31/2019	65	0.19	32	0.20	212	0.15	400	0.23	ACCEPT
	Pitot		66		33		213		398		
T7-9	Reference	12/31/2019	65	0.38	32	0.61	210	0.30	365	0.24	ACCEPT
	Pitot		67		35		208		363		
T7-10	Reference	12/31/2019	65	0.19	33	0.41	210	0.15	370	0.24	ACCEPT
	Pitot		66		35		211		372		
T7-11	Reference	12/30/2019	66	0.00	33	0.20	212	0.00	379	0.12	ACCEPT
	Pitot		66		34		212		380		
T7-12	Reference	12/31/2019	65	0.57	32	0.61	210	0.30	365	0.36	ACCEPT
	Pitot		68		35		208		362		
T7-13	Reference	12/30/2019	66	0.00	34	0.00	210	0.00	380	0.12	ACCEPT
	Pitot		66		34		210		379		
T8-1P	Reference	12/31/2019	65	0.38	33	0.41	212	0.30	380	0.24	ACCEPT
	Pitot		67		35		210		382		
T8-2	Reference	12/30/2019	66	0.00	34	0.00	212	0.15	377	0.00	ACCEPT
	Pitot		66		34		211		377		
T8-4I	Reference	12/31/2019	65	0.38	32	0.61	210	0.30	370	0.36	ACCEPT
	Pitot		67		35		208		367		
T8-5I	Reference	12/31/2019	65	0.38	33	0.61	210	0.45	370	0.24	ACCEPT
	Pitot		67		36		207		368		
T8-6I	Reference	12/31/2019	65	0.19	33	0.61	210	0.30	365	0.24	ACCEPT
	Pitot		66		36		208		363		
T8-7	Reference	12/31/2019	65	0.38	33	0.61	210	0.30	370	0.48	ACCEPT
	Pitot		67		36		208		366		
T8-10	Reference	12/30/2019	66	0.00	34	0.00	210	0.15	374	0.24	ACCEPT
	Pitot		66		34		209		372		
T8-11	Reference	12/30/2019	66	0.00	33	0.20	212	0.30	378	0.24	ACCEPT
	Pitot		66		34		210		376		
8-18	Reference	12/31/2019	65	0.19	33	0.41	210	0.15	365	0.36	ACCEPT
	Pitot		66		35		211		362		
T8-19	Reference	12/31/2019	65	0.19	33	0.41	212	0.45	380	0.36	ACCEPT
	Pitot		66		35		209		383		
T8-20	Reference	12/31/2019	65	0.38	33	0.41	210	0.45	370	0.48	ACCEPT
	Pitot		67		35		207		366		
T8-21	Reference	12/31/2019	65	0.38	33	0.41	212	0.30	380	0.36	ACCEPT
	Pitot		67		35		210		383		
T8-22	Reference	12/31/2019	65	0.19	32	0.41	212	0.15	380	0.12	ACCEPT
	Pitot		66		34		211		379		
8-23	Reference	12/31/2019	65	0.38	33	0.41	212	0.30	365	0.24	ACCEPT
	Pitot		67		35		210		367		
T8-24	Reference	12/31/2019	64	0.19	32	0.20	212	0.00	400	0.00	ACCEPT
	Pitot		65		33		212		400		
T8-25	Reference	12/31/2019	65	0.38	33	0.41	210	0.30	370	0.36	ACCEPT
	pitot		67		35		208		367		
T8-26P	Reference	12/31/2019	65	0.00	33	0.41	212	0.45	390	0.35	ACCEPT
	pitot		65		35		209		387		
T8-27P	Reference	12/31/2019	65	0.19	33	0.41	212	0.30	380	0.24	ACCEPT
	pitot		66		35		210		382		
T9-1	Reference	1/2/2020	65	0.00	32	0.41	212	0.15	370	0.36	ACCEPT
	Pitot		65		34		213		373		
T9-2	Reference	1/20/2020	65	0.19	32	0.41	212	0.30	370	0.36	ACCEPT
	Pitot		66		34		214		373		
T9-3	Reference	1/2/2020	65	0.19	32	0.41	212	0.30	370	0.48	ACCEPT
	Pitot		66		34		214		374		
T9-4	Reference	1/2/2020	65	0.19	32	0.61	212	0.15	370	0.48	ACCEPT
	Pitot		66		35		213		374		
T9-5	Reference	12/30/2019	66	0.19	33	0.00	210	0.15	376	0.12	ACCEPT
	Pitot		65		33		211		375		
T9-6	Reference	12/30/2019	66	0.00	33	0.00	212	0.15	410	0.23	ACCEPT
	Pitot		66		33		211		408		

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff. %	Cold Bath	Diff. %	Hot Bath	Diff. %	HOT OIL	Diff. %	Accept/Reject
T9-7	Reference	1/2/2020	65	0.19	32	0.61	212	0.30	370	0.48	ACCEPT
	Pitot		66		35		214		374		
T10-1	Reference	1/2/2020	65	0.19	32	0.41	212	0.30	380	0.24	ACCEPT
	Pitot		66		34		210		378		
T10-2P	Reference	1/2/2020	65	0.19	32	0.41	212	0.15	380	0.24	ACCEPT
	Pitot		66		34		211		382		
T10-4	Reference	1/2/2020	65	0.19	32	0.41	212	0.30	380	0.48	ACCEPT
	Pitot		66		34		210		376		
T10-5	Reference	1/2/2020	65	0.38	32	0.20	212	0.15	380	0.24	ACCEPT
	Pitot		67		33		213		382		
T10-6	Reference	1/2/2020	65	0.19	32	0.41	212	0.15	370	0.36	ACCEPT
	Pitot		66		34		211		367		
T10-7	Reference	1/2/2020	65	0.19	32	0.61	212	0.30	370	0.24	ACCEPT
	Pitot		66		35		210		368		
T10-8	Reference	1/2/2020	65	0.19	32	0.61	212	0.15	380	0.48	ACCEPT
	Pitot		66		35		211		376		
T10-9	Reference	1/2/2020	65	0.19	32	0.61	212	0.30	380	0.36	ACCEPT
	Pitot		66		35		210		377		
T12-1	Reference	1/2/2020	65	0.19	32	0.20	212	0.15	380	0.24	ACCEPT
	Pitot		66		33		211		382		
T12-2	Reference	1/2/2020	65	0.19	32	0.41	213	0.30	380	0.36	ACCEPT
	Pitot		66		34		211		383		
T12-3	Reference	1/2/2020	65	0.19	32	0.61	212	0.30	370	0.24	ACCEPT
	Pitot		66		35		210		368		
T12-4	Reference	1/2/2020	65	0.19	32	0.41	213	0.30	380	0.60	ACCEPT
	Pitot		66		34		211		375		
T12-5	Reference	1/2/2020	65	0.19	32	0.41	212	0.15	375	0.24	ACCEPT
	Pitot		66		34		213		373		
T14-1	Reference	12/31/2019	65	0.00	33	0.20	212	0.15	372	0.12	ACCEPT
	Pitot		65		34		211		371		
T14-2	Reference	12/21/2019	65	0.00	32	0.00	212	0.00	376	0.12	ACCEPT
	Pitot		65		32		212		375		
T15-1	Reference	12/31/2019	65	0.19	33	0.00	210	0.15	380	0.60	ACCEPT
	Pitot		66		33		209		375		
T15-2	Reference	12/31/2019	65	0.19	34	0.20	212	0.30	390	0.47	ACCEPT
	Pitot		66		35		210		386		
T15-3	Reference	12/31/2019	65	0.00	32	0.00	212	0.00	374	0.24	ACCEPT
	Pitot		65		32		212		372		
T20-1	Reference	12/27/2018	69	0.00	32	0.00	212	0.15	402	0.58	ACCEPT
	Pitot		69		32		211		397		
DB-1	Reference	12/26/2019	67	0.09	33	0.14	211	0.18		0.00	ACCEPT
	Pitot		67.5		33.7		212.2				
WB-1	Reference	12/26/2019	67	0.13	32	0.41	212	0.31		0.00	ACCEPT
	Pitot		67.7		34		209.9				
DB-2	Reference	12/26/2019	67	0.11	33	0.16	212	0.03		0.00	ACCEPT
	Pitot		67.6		33.8		212.2				
WB-2	Reference	12/26/2019	67	0.09	33	0.32	212	0.10		0.00	ACCEPT
	Pitot		67.5		34.6		211.3				
DB-3	Reference	12/26/2019	67	0.34	33	0.02	212	0.09		0.00	ACCEPT
	Pitot		68.8		32.9		211.4				
WB-3	Reference	12/26/2019	67	0.21	33	0.32	212	0.19		0.00	ACCEPT
	Pitot		68.1		34.6		210.7				
DB-4	Reference	12/26/2019	67	0.06	33	0.16	212	0.04		0.00	ACCEPT
	Pitot		67.3		33.8		211.7				
WB-4	Reference	12/26/2019	67	0.21	33	0.30	212	0.04		0.00	ACCEPT
	Pitot		68.1		34.5		212.3				
DB-5	Reference	12/26/2019	67	0.09	33	0.18	213	0.27		0.00	ACCEPT
	Pitot		67.5		32.1		211.2				
WB-5	Reference	12/26/2019	67	0.09	33	0.43	213	0.33		0.00	ACCEPT
	Pitot		67.5		35.1		210.8				
DB-7	Reference	12/26/2019	67	0.00	33	0.02	213	0.40		0.00	ACCEPT
	Pitot		67		32.9		210.3				
WB-7	Reference	12/26/2019	67	0.09	33	0.32	213	0.49		0.00	ACCEPT
	Pitot		67.5		34.6		209.7				
DB-8	Reference	12/26/2019	67	0.02	33	0.10	212	0.03		0.00	ACCEPT
	Pitot		67.1		33.5		211.8				
WB-8	Reference	12/26/2019	67	0.13	33	0.37	212	0.15		0.00	ACCEPT
	Pitot		67.7		34.8		211				
4467	Reference	12/23/2019	63	0.38	32	0.00	212	0.15		0.00	ACCEPT
	Pitot		61		32		211				
LT1-2	Reference	12/23/2019	63	0.38	32	0.41	212	0.00		0.00	ACCEPT
	Pitot		65		34		212				
BH-2	Reference	12/23/2019	63	0.19	32	0.20	212	0.45		0.00	ACCEPT
	Pitot		64		33		209				
BH-4	Reference	12/23/2019	63	0.19	32	0.20	212	0.15		0.00	ACCEPT
	Pitot		62		33		211				
BH-7	Reference	12/23/2019	63	0.19	32	0.20	212	0.45		0.00	ACCEPT
	Pitot		64		33		209				

ENVIRONMENTAL QUALITY MANAGEMENT

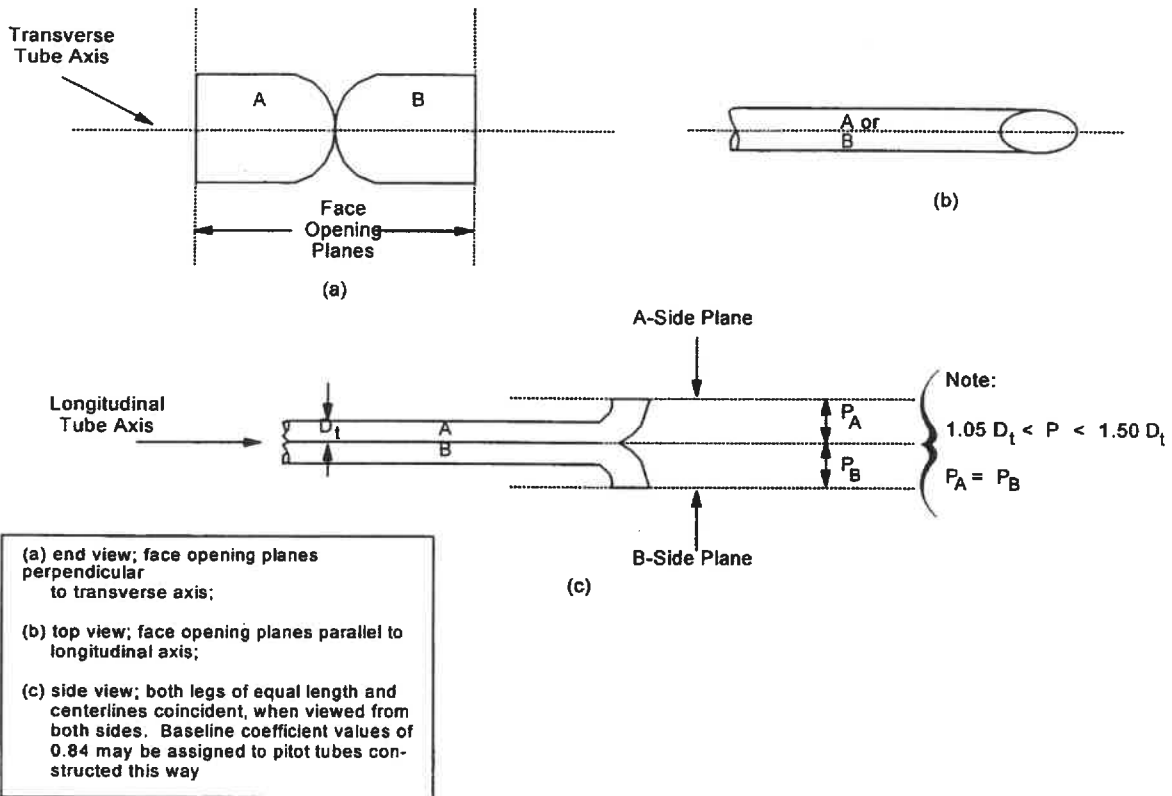
Thermo.	Therm.	Date	Ambient	Diff., %	Cold Bath	Diff., %	Hot Bath	Diff., %	HOT OIL	Diff., %	Accept/Reject
BH-14	Reference	12/23/2019	63	0.38	32	0.00	212	0.60		0.00	ACCEPT
	Pitot		61		32		208				
BH-15	Reference	12/23/2019	63	0.00	32	0.00	212	0.45		0.00	ACCEPT
	Pitot		63		32		209				
BH-19	Reference	12/23/2019	63	0.38	32	0.61	212	0.00		0.00	ACCEPT
	Pitot		65		35		212				
BH-20	Reference	12/23/2019	63	0.00	32	0.20	212	0.45		0.00	ACCEPT
	Pitot		63		33		209				
BH-21	Reference	12/23/2019	63	0.00	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		63		34		210				
BH-22	Reference	12/23/2019	63	0.00	32	0.20	212	0.30		0.00	ACCEPT
	Pitot		63		33		210				
BH-23	Reference	12/23/2019	63	0.19	32	0.20	212	0.15		0.00	ACCEPT
	Pitot		62		33		211				
BH-24	Reference	12/23/2019	63	0.38	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		61		34		210				
BH-26	Reference	12/23/2019	63	0.00	32	0.61	212	0.45		0.00	ACCEPT
	Pitot		63		35		209				
BH-27	Reference	12/23/2019	63	0.19	32	0.61	212	0.30		0.00	ACCEPT
	Pitot		64		35		210				
BH-29	Reference	12/23/2019	63	0.19	32	0.61	212	0.30		0.00	ACCEPT
	Pitot		64		35		214				
BH-30	Reference	12/23/2019	65	0.19	32	0.41	212	0.15		0.00	ACCEPT
	Pitot		64		34		211				
BH-31	Reference	12/23/2019	63	0.57	32	0.20	212	0.15		0.00	ACCEPT
	Pitot		66		33		211				
BH-32	Reference	12/23/2019	63	0.19	32	0.00	212	0.00		0.00	ACCEPT
	Pitot		64		32		212				
BH-33	Reference	12/23/2019	63	0.38	32	0.20	212	0.45		0.00	ACCEPT
	Pitot		61		33		209				
BH-34	Reference	12/23/2019	63	0.38	32	0.00	212	0.00		0.00	ACCEPT
	Pitot		65		32		212				
BH-35	Reference	12/23/2019	63	0.19	32	0.00	212	0.00		0.00	ACCEPT
	Pitot		62		32		212				
BH-36	Reference	12/23/2019	63	0.38	32	0.00	212	0.00		0.00	ACCEPT
	Pitot		65		32		212				
BH-37	Reference	12/23/2019	63	0.19	32	0.00	212	0.15		0.00	ACCEPT
	Pitot		64		32		211				
BH-38	Reference	12/23/2019	63	0.19	32	0.00	212	0.30		0.00	ACCEPT
	Pitot		62		32		214				
BH-39	Reference	12/23/2019	63	0.38	32	0.41	212	0.00		0.00	ACCEPT
	Pitot		65		34		212				
BH-40	Reference	12/23/2019	63	0.00	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		63		34		210				
BH-41	Reference	12/23/2019	63	0.19	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		64		34		210				
BH-42	Reference	12/23/2019	63	0.19	32	0.61	212	0.45		0.00	ACCEPT
	Pitot		64		35		209				
BH-43	Reference	12/23/2019	63	0.19	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		64		34		210				
BH-45	Reference	12/23/2019	63	0.38	32	0.20	212	0.30		0.00	ACCEPT
	Pitot		65		33		210				
BH-46	Reference	12/23/2019	63	0.38	32	0.41	212	0.15		0.00	ACCEPT
	Pitot		65		34		211				

ENVIRONMENTAL QUALITY MANAGEMENT

Thermo.	Therm.	Date	Ambient	Diff. %	Cold Bath	Diff. %	Hot Bath	Diff. %	HOT OIL	Diff. %	Accept/Reject
BH-47	Reference	12/23/2019	63	0.38	32	0.41	212	0.45		0.00	ACCEPT
	Pitot		61		34		209				
BH-48	Reference	12/23/2019	63	0.38	32	0.20	212	0.45		0.00	ACCEPT
	Pitot		65		33		209				
BH-49	Reference	12/23/2019	63	0.38	32	0.41	212	0.30		0.00	ACCEPT
	Pitot		65		34		210				
BH-50	Reference	12/23/2019	63	0.19	32	0.41	212	0.15		0.00	ACCEPT
	Pitot		62		34		211				
BH-51	Reference	12/23/2019	63	0.19	32	0.00	212	0.15		0.00	ACCEPT
	Pitot		64		32		211				
ST-1	Reference	12/23/2019	65	0.00	32	0.41	212	0.15	400	0.81	ACCEPT
	Pitot		65		34		211		393		
ST-2	Reference	12/23/2019	65	0.00	32	0.61	212	0.30	400	0.00	ACCEPT
	Pitot		65		35		210		400		
ST-3	Reference	12/23/2019	65	0.00	32	0.61	212	0.30	400	0.35	ACCEPT
	Pitot		65		35		210		403		
ST-4	Reference	12/23/2019	65	0.19	32	0.41	212	0.60	400	0.58	ACCEPT
	Pitot		66		34		208		395		
ST-5	Reference	12/23/2019	65	0.19	32	0.20	212	0.15	400	0.58	ACCEPT
	Pitot		66		33		213		405		
ST-6	Reference	12/23/2019	65	0.19	32	0.20	212	0.00	400	0.12	ACCEPT
	Pitot		66		33		212		399		

PITOT TUBE CALIBRATION

Each pitot tube used in sampling meets all requirements of EPA Method 2, Section 4.1.** Therefore, a baseline coefficient of 0.84 is assigned to each pitot tube. The following pages show the alignment requirements of Method 2 and the Pitot Tube Inspection Data Sheet(s) for each pitot tube used during the test program.



**40 CFR 60, Appendix A, July 1995

Environmental Quality Management Pitot Tube Calibrations

Pitot ID	Date Calibrated	α_1	β_1	α_2	β_2	Y	θ	A	z	w	P_u	P_D	D_t	A/2/D _t	Accept/Reject
MP-1	12/18/2019	2	3.2	2.5	0.5	1.1	0.3	0.340	0.007	0.002	0.170	0.170	0.141	1.206	REJECT
MP-2	12/18/2019	1.1	2.8	1.0	3.1	2.1	0.2	0.366	0.013	0.001	0.183	0.183	0.142	1.289	REJECT
MP-3	12/18/2019	5.0	1.6	3.0	2.3	1.0	0.2	0.44	0.008	0.002	0.220	0.220	0.205	1.073	ACCEPT
MP-4	12/18/2019	1.8	1.6	3.0	1.3	2.9	1.8	0.483	0.024	0.015	0.242	0.242	0.2	1.208	ACCEPT
P1-1	12/18/2019	0.3	1.3	4.3	0.5	1.2	0.3	0.642	0.013	0.003	0.321	0.321	0.255	1.259	ACCEPT
P1-2	12/18/2019	2.7	0.0	1.9	1.0	1.5	1.0	0.876	0.023	0.015	0.438	0.438	0.375	1.168	ACCEPT
T1-1	12/18/2019	0.0	0.0	2.0	1.0	1.9	0.7	0.935	0.031	0.011	0.468	0.468	0.375	1.247	ACCEPT
T1-2	12/18/2019	3.5	0.1	0.5	2.9	2.1	0.3	0.928	0.034	0.005	0.464	0.464	0.375	1.237	ACCEPT
MP2-1	12/18/2019	2.5	0.8	3.0	1.5	1.5	0.4	0.470	0.012	0.003	0.235	0.235	0.205	1.146	ACCEPT
P2-2	12/18/2019	2.4	0.1	1.2	1.0	2.5	1.9	0.942	0.041	0.031	0.471	0.471	0.375	1.256	ACCEPT
T2-1	12/18/2019	4.0	0.5	4.9	1.2	1.9	0.4	0.954	0.032	0.007	0.477	0.477	0.375	1.272	ACCEPT
T2-2	12/18/2019	1.4	0.5	0.9	0.4	1.2	0.0	0.821	0.017	0.000	0.411	0.411	0.375	1.095	ACCEPT
T2-3	12/18/2019	0.0	0.7	0.3	0.7	0.7	1.8	0.955	0.012	0.030	0.478	0.478	0.375	1.273	ACCEPT
T2-4	12/18/2019	0.5	0.1	0.7	0.8	2.6	0.0	0.825	0.037	0.000	0.413	0.413	0.375	1.100	ACCEPT
T2-5	12/18/2019	0.6	0.1	0.5	0.3	0.0	0.8	0.825	0.000	0.012	0.413	0.413	0.375	1.100	ACCEPT
T2-6	12/18/2019	2.1	0.0	1.5	0.2	0.2	0.2	0.846	0.003	0.003	0.423	0.423	0.375	1.128	ACCEPT
T2-7	12/18/2019	0.1	0.1	2.6	0.4	3.0	0.0	0.832	0.044	0.000	0.416	0.416	0.375	1.109	ACCEPT
T2-8	12/18/2019	1.8	0.2	1.1	0.5	1.9	0.6	0.830	0.028	0.009	0.415	0.415	0.375	1.107	ACCEPT
T2-9I	12/18/2019	0.7	1.5	1.5	0.9	1.7	1.0	0.945	0.028	0.016	0.473	0.473	0.375	1.260	ACCEPT
T2-10	12/18/2019	1.4	1.5	1.7	0.7	0.0	0.0	0.928	0.000	0.000	0.464	0.464	0.375	1.237	ACCEPT
T2-11	12/18/2019	0.5	0.3	2.1	1.4	0.5	1.7	0.946	0.008	0.028	0.473	0.473	0.375	1.261	ACCEPT
T2-12	12/18/2019	4.0	0.7	2.0	0.1	1.2	0.3	0.948	0.020	0.005	0.474	0.474	0.375	1.264	ACCEPT
T2-13	12/18/2019	1.4	1.4	0.5	0.5	1.0	0.0	0.859	0.015	0.000	0.430	0.430	0.375	1.145	ACCEPT
T2-14	12/18/2019	2.0	1.6	2.5	0.3	0.6	0.8	0.842	0.009	0.012	0.421	0.421	0.375	1.123	ACCEPT
T2-15	12/18/2019	0.4	2.0	0.1	2.5	0.8	0.2	0.850	0.012	0.003	0.425	0.425	0.375	1.133	ACCEPT
T2-16	12/18/2019	0.3	2.0	0.3	2.2	0.5	0.1	0.858	0.007	0.001	0.429	0.429	0.375	1.144	ACCEPT
T2-20	12/18/2019	3.0	0.8	4.0	0.6	2.1	1.8	0.972	0.036	0.031	0.486	0.486	0.375	1.296	ACCEPT
T3-1	12/18/2019	1.8	0.3	1.5	0.7	1.8	0.6	0.958	0.030	0.010	0.479	0.479	0.375	1.277	ACCEPT
T3-2	12/18/2019	0.5	0.8	1.0	0.4	0.3	0.3	0.954	0.005	0.005	0.477	0.477	0.375	1.272	ACCEPT
T3-3P	12/18/2019	1.1	1.3	0.3	1.2	2.6	0.3	0.960	0.044	0.005	0.480	0.480	0.375	1.280	ACCEPT
T3-4P	12/18/2019	1.4	3.4	1.2	0.3	1.0	1.0	0.875	0.015	0.015	0.438	0.438	0.375	1.167	ACCEPT
T3-5	12/18/2019	0.2	0.1	0.9	1.1	1.5	0.0	0.973	0.025	0.000	0.487	0.487	0.375	1.297	ACCEPT
T3-6	12/18/2019	0.7	0.0	1.1	0.7	0.3	1.5	0.952	0.005	0.025	0.476	0.476	0.375	1.269	ACCEPT
T3-7	12/18/2019	4.0	1.8	3.7	1.2	3.1	1.9	0.935	0.051	0.031	0.468	0.468	0.375	1.247	ACCEPT
T3-8	12/18/2019	1.0	2.1	1.4	2.4	1.0	0.8	0.954	0.017	0.013	0.477	0.477	0.375	1.272	ACCEPT
T3-9I	12/18/2019	0.4	0.1	2.0	0.5	0.0	0.8	0.645	0.000	0.009	0.323	0.323	0.265	1.217	ACCEPT
T3-10I	12/18/2019	2.5	1.4	1.6	0.7	1.0	0.3	0.960	0.017	0.005	0.480	0.480	0.375	1.280	ACCEPT
T3-11I	12/18/2019	2.9	1.7	2.3	1.6	2.0	0.0	0.950	0.033	0.000	0.475	0.475	0.375	1.267	ACCEPT
T3-12	12/18/2019	8.6	0.7	1.8	2.1	1.1	0.4	0.869	0.017	0.006	0.435	0.435	0.375	1.159	ACCEPT
T3-13	12/18/2019	2.8	1.4	0.8	1.2	2.9	1.6	0.981	0.050	0.027	0.491	0.491	0.375	1.308	ACCEPT
T3-14	12/18/2019	0.2	2.0	0.0	1.2	0.5	1.5	0.926	0.008	0.024	0.463	0.463	0.375	1.235	ACCEPT
T3-16	12/18/2019	0.7	0.7	0.1	0.5	0.0	1.0	0.876	0.000	0.015	0.438	0.438	0.375	1.168	ACCEPT
T3-17	12/18/2019	0.0	2.1	0.0	1.6	1.5	1.9	0.906	0.024	0.030	0.453	0.453	0.375	1.208	ACCEPT
T3-19	12/18/2019	1.3	2.8	2.6	2.6	1.0	0.4	0.926	0.016	0.006	0.463	0.463	0.375	1.235	ACCEPT
T3-22	12/18/2019	1.1	0.6	2.5	0.3	2.5	0.5	0.959	0.042	0.008	0.480	0.480	0.375	1.279	ACCEPT
T3-24P	12/20/2019	0.6	2.9	0.6	0.3	1.4	1.7	0.898	0.022	0.027	0.449	0.449	0.375	1.197	ACCEPT
T3-25P	12/20/2019	1.3	0.3	1.7	0.7	0.6	1.9	0.922	0.010	0.031	0.461	0.461	0.375	1.229	ACCEPT

Environmental Quality Management

Pitot Tube Calibrations

Pitot ID	Date Calibrated	α_1	β_1	α_2	β_2	γ	θ	A	z	w	P_{10}	P_{15}	D_t	A/2/D _t	Accept/Reject
MP4-1	12/19/2019	3.6	1.1	2.5	4.3	3.8	1.3	0.704	0.047	0.016	0.352	0.352	0.273	1.289	ACCEPT
T4-1	12/19/2019	0.3	3.7	1.8	2.7	1.2	1.8	0.952	0.020	0.030	0.476	0.476	0.375	1.269	ACCEPT
T4-3	12/19/2019	0.5	0.3	1.6	1.4	0.3	0.5	0.935	0.005	0.008	0.468	0.468	0.375	1.247	ACCEPT
T4-4P	12/19/2019	2.2	1.3	1.6	1.2	0.7	1.0	0.949	0.012	0.017	0.475	0.475	0.375	1.265	ACCEPT
T4-5	12/19/2019	1.6	0.5	1.9	0.5	0.2	1.4	0.942	0.003	0.023	0.471	0.471	0.375	1.256	ACCEPT
T4-6P	12/19/2019	1.7	1.6	0.0	1.5	1.8	0.2	0.920	0.029	0.003	0.460	0.460	0.375	1.227	ACCEPT
T4-7	12/19/2019	2.0	1.4	2.1	1.6	1.4	1.1	0.950	0.023	0.018	0.475	0.475	0.375	1.267	ACCEPT
T4-8P	12/19/2019	0.3	0.8	0.3	1.4	0.3	1.7	0.964	0.005	0.029	0.482	0.482	0.375	1.285	ACCEPT
T4-10	12/19/2019	3.1	0.8	4.6	1.1	2.5	2.1	0.844	0.037	0.031	0.422	0.422	0.375	1.125	ACCEPT
T4-13	12/19/2019	1.2	0.2	1.2	0.6	0.9	1.1	0.942	0.015	0.018	0.471	0.471	0.375	1.256	ACCEPT
T4-14	12/19/2019	2.5	0.7	2.8	0.4	2.1	0.0	0.944	0.035	0.000	0.472	0.472	0.375	1.259	ACCEPT
T4-16	12/19/2019	1.0	0.0	0.5	0.5	0.5	0.6	0.938	0.008	0.010	0.469	0.469	0.375	1.251	ACCEPT
T4-17	12/19/2019	4.1	1.5	3.5	1.7	4.5	1.1	0.954	0.075	0.018	0.477	0.477	0.375	1.272	ACCEPT
4-18	12/19/2019	1.6	1.5	0.3	0.5	0.0	0.3	0.934	0.000	0.005	0.467	0.467	0.375	1.245	ACCEPT
T4-19	12/19/2019	1.1	0.1	2.5	0.1	1.6	0.2	0.896	0.025	0.003	0.448	0.448	0.375	1.195	ACCEPT
T4-20	12/19/2019	1.7	0.1	0.0	0.5	1.2	0.4	0.816	0.017	0.006	0.408	0.408	0.375	1.088	ACCEPT
T4-21	12/19/2019	2.8	1.2	1.7	1.5	2.8	0.0	0.882	0.043	0.000	0.441	0.441	0.375	1.176	ACCEPT
T4-22	12/19/2019	3.2	3.1	1.4	1.7	1.5	0.4	0.900	0.024	0.006	0.450	0.450	0.375	1.200	ACCEPT
T4-23	12/19/2019	1.1	3.1	0.7	1.7	2.5	0.7	0.862	0.038	0.011	0.431	0.431	0.375	1.149	ACCEPT
T4-25	12/19/2019	3.8	0.6	3.5	0.3	4.0	0.6	0.853	0.060	0.009	0.427	0.427	0.375	1.137	ACCEPT
T4-26	12/19/2019	2.5	1.0	2.1	0.0	2.2	0.3	0.841	0.032	0.004	0.421	0.421	0.375	1.121	ACCEPT
T5-2	12/19/2019	6.1	1.9	6.4	1.9	4.3	1.8	0.955	0.072	0.030	0.478	0.478	0.375	1.273	ACCEPT
T5-4	12/19/2019	1.6	0.5	1.1	0.1	0.3	0.7	0.932	0.005	0.011	0.466	0.466	0.375	1.243	ACCEPT
T5-7P	12/19/2019	3.8	2.7	3.1	0.9	1.4	1.7	0.836	0.020	0.025	0.418	0.418	0.375	1.115	ACCEPT
T5-8	12/19/2019	1.2	0.0	0.2	0.2	1.7	0.0	0.948	0.028	0.000	0.474	0.474	0.375	1.264	ACCEPT
T5-9	12/19/2019	0.1	1.6	0.2	1.9	0.6	1.8	0.965	0.010	0.030	0.483	0.483	0.375	1.287	ACCEPT
T5-10	12/19/2019	0.6	1.3	1.3	1.5	2.1	1.6	0.960	0.035	0.027	0.480	0.480	0.375	1.280	ACCEPT
T5-11	12/19/2019	0.0	0.3	0.3	0.8	1.9	0.9	0.938	0.031	0.015	0.469	0.469	0.375	1.251	ACCEPT
T5-12	12/19/2019	2.5	1.0	1.6	1.1	1.0	0.5	0.904	0.016	0.008	0.452	0.452	0.375	1.205	ACCEPT
T5-13	12/19/2019	0.3	0.8	2.1	0.9	1.8	0.5	0.952	0.030	0.008	0.476	0.476	0.375	1.269	ACCEPT
T5-14	12/19/2019	0.4	2.2	1.3	3.7	0.1	1.4	0.950	0.002	0.023	0.475	0.475	0.375	1.267	ACCEPT
T5-15	12/19/2019	2.4	3.2	1.0	2.2	1.1	0.9	0.949	0.018	0.015	0.475	0.475	0.375	1.265	ACCEPT
T5-16	12/19/2019	0.0	1.0	2.4	0.2	0.1	0.0	0.860	0.002	0.000	0.430	0.430	0.375	1.147	ACCEPT
T5-17	12/19/2019	0.6	0.3	0.5	1.0	0.6	1.9	0.932	0.010	0.031	0.466	0.466	0.375	1.243	ACCEPT
T6-1	12/19/2019	2.3	1.9	1.9	0.3	0.5	0.2	0.961	0.008	0.003	0.481	0.481	0.375	1.281	ACCEPT
T6-2	12/19/2019	2.8	0.9	2.0	1.8	3.0	1.7	0.958	0.050	0.028	0.479	0.479	0.375	1.277	ACCEPT
T6-3	12/19/2019	1.6	0.4	6.4	0.9	4.1	1.6	0.935	0.067	0.026	0.468	0.468	0.375	1.247	ACCEPT
T6-5P	12/19/2019	0.8	1.7	0.5	0.1	2.7	0.8	0.938	0.044	0.013	0.469	0.469	0.375	1.251	ACCEPT
T6-7	12/19/2019	1.8	0	2.7	0	1.5	0.2	0.948	0.025	0.003	0.474	0.474	0.375	1.264	ACCEPT
T6-9	12/19/2019	0.3	0.8	0.8	1.8	0.0	0.6	0.944	0.000	0.010	0.472	0.472	0.375	1.259	ACCEPT
T6-10	12/19/2019	0.5	0.0	1.6	0.7	1.0	0.8	0.954	0.017	0.013	0.477	0.477	0.375	1.272	ACCEPT
T6-12P	12/19/2019	1.4	1.9	0.8	1.2	0.8	0.4	0.956	0.013	0.007	0.478	0.478	0.375	1.275	ACCEPT
T6-13	12/19/2019	0.3	0.7	0.1	0.1	1.3	0.0	0.936	0.021	0.000	0.468	0.468	0.375	1.248	ACCEPT
T6-14P	12/19/2019	1.7	1.8	2.2	1.3	1.7	1.1	0.963	0.029	0.018	0.482	0.482	0.375	1.284	ACCEPT
T6-15P	12/19/2019	0.5	1.2	0.5	1.2	0.8	1.5	0.932	0.013	0.024	0.466	0.466	0.375	1.243	ACCEPT
T6-16	12/19/2019	1.8	0.4	0.1	0.1	0.0	0.1	0.954	0.000	0.002	0.477	0.477	0.375	1.272	ACCEPT
T6-17	12/19/2019	2.1	1.3	1.0	1.9	2.6	0.3	0.970	0.044	0.005	0.485	0.485	0.375	1.293	ACCEPT
T6-18	12/19/2019	1.4	1.7	0.3	1.0	1.9	1.3	0.896	0.030	0.020	0.448	0.448	0.375	1.195	ACCEPT
T6-19	12/19/2019	3.5	0.2	4.8	1.8	2.8	1.0	1.061	0.052	0.019	0.531	0.531	0.375	1.415	ACCEPT
T6-20	12/19/2019	0.4	0.9	2.4	1.7	2.0	1.5	0.938	0.033	0.025	0.469	0.469	0.375	1.251	ACCEPT

TRIP BALANCE

The trip balance is calibrated by comparing it with Class-S standard weights, and it agreed within 0.5g. Calibration data are shown in the following Trip Balance Calibration Data Sheet(s).



ALPHA-LIBERTY COMPANY, INC.

BALANCES & SCALES

P.O. Box 276, West Chester, OH 45069

513-777-1525 FAX 513-777-0819

CERTIFICATE OF CALIBRATION

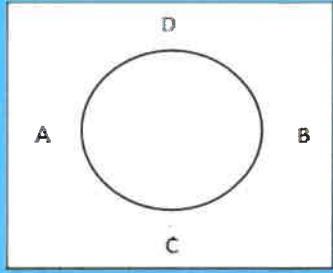
COMPANY: Environmental Quality Management, Inc. CERTIFICATE: D21840-001

LOCATION: 1800 Carillan Drive, Cincinnati, OH 45240 Attn: Ron Kolde

MANUFACTURER: Sartorius CAPACITY: 210g RESOLUTION: 0.1mg

MODEL: BL210S SERIAL NO: 91001024 ID: _____ SCHEDULE: yearly

This balance/scale performed to the following values on the calibration date:

WEIGHT	TOLERANCE	BEFORE	in	out	AFTER	in	out					
Zero	±0.3mg	0.0000	✓		0.0000	✓						
20g	±0.3mg	20.0010		✓	20.0000	✓						
50g	±0.3mg	50.0017		✓	50.0000	✓						
100g	±0.3mg	100.0031		✓	100.0000	✓						
200g	±0.3mg	200.0063		✓	200.0000	✓						
CORNERLOAD WEIGHT:		100g			TOLERANCE:		±0.5mg					
	A	in	out	B	in	out	C	in	out	D	in	out
BEFORE READING	0.0000	✓		-0.0004	✓		-0.0004	✓		0.0000	✓	
AFTER READING	0.0000	✓		-0.0004	✓		-0.0004	✓		0.0000	✓	
WEIGHT SET NUMBER	A500028											
TRACEABILITY NUMBER	2710662											
NEXT CALIBRATION DUE	December-20											
CALIBRATION DATE	23-Dec-2019											
TECHNICIAN SIGNATURE	<i>Susan Q. Lewis</i>											
												

CALIBRATION SITE: Customer Site Laboratory Other

CALIBRATION METHOD: Manufacturer's Procedure Other

ISO/IEC 17025: Compliant Non-compliant Not Applicable

ENVIRONMENT: Excellent Good Fair Poor

NOTES: 2 static masters

The calibrations within this certificate are traceable through NIST to the International System of Units (SI).

QF 175.10.1, Sheet 49 Rev. 5

This certificate shall not be reproduced, except in full, without written approval of Alpha-Liberty Company, Inc.



ALPHA-LIBERTY COMPANY, INC.

BALANCES & SCALES

P.O. Box 276, West Chester, OH 45069

513-777-1525 FAX 513-777-0819

CERTIFICATE OF CALIBRATION

COMPANY: Environmental Quality Management, Inc. CERTIFICATE: D21840-009

LOCATION: 1800 Carillan Drive, Cincinnati, OH 45240 Attn: Ron Kolde

MANUFACTURER: A&D CAPACITY: 2000g RESOLUTION: 0.1g

MODEL: EJ 2000 SERIAL NO: 5A2856052 ID: _____ SCHEDULE: yearly

This balance/scale performed to the following values on the calibration date:

WEIGHT	TOLERANCE	BEFORE	in	out	AFTER	in	out					
Zero	±0.3g	0.0	✓		0.0	✓						
200g	±0.3g	200.0	✓		200.0	✓						
500g	±0.3g	499.9	✓		500.0	✓						
1000g	±0.3g	999.9	✓		1000.0	✓						
2000g	±0.3g	1999.7	✓		2000.0	✓						
CORNERLOAD WEIGHT:		1000g			TOLERANCE:		±0.3g					
	A	in	out	B	in	out	C	in	out	D	in	out
BEFORE READING	0.0	✓		0.0	✓		0.0	✓		0.0	✓	
AFTER READING	0.0	✓		0.0	✓		0.0	✓		0.0	✓	
WEIGHT SET NUMBER	A500120											
TRACEABILITY NUMBER	2710662											
NEXT CALIBRATION DUE	December-20											
CALIBRATION DATE	23-Dec-2019											
TECHNICIAN SIGNATURE	<i>Susan A. Lewis</i>											

CALIBRATION SITE: Customer Site Laboratory Other

CALIBRATION METHOD: Manufacturer's Procedure Other

ISO/IEC 17025: Compliant Non-compliant Not Applicable

ENVIRONMENT: Excellent Good Fair Poor

NOTES: _____

The calibrations within this certificate are traceable through NIST to the International System of Units (SI).

QF 175.10.1, Sheet 49 Rev. 5

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ALPHA-LIBERTY COMPANY, INC.

BALANCES & SCALES

P.O. Box 276, West Chester, OH 45069

513-777-1525 FAX 513-777-0819

CERTIFICATE OF CALIBRATION

COMPANY: Environmental Quality Management, Inc. CERTIFICATE: D21840-008

LOCATION: 1800 Carillan Drive, Cincinnati, OH 45240 Attn: Ron Kolde

MANUFACTURER: A&D CAPACITY: 2000g RESOLUTION: 0.1g

MODEL: EJ 2000 SERIAL NO: 5A2856060 ID: _____ SCHEDULE: yearly

This balance/scale performed to the following values on the calibration date:

WEIGHT	TOLERANCE	BEFORE	in	out	AFTER	in	out					
Zero	±0.3g	0.0	✓		0.0	✓						
200g	±0.3g	200.0	✓		200.0	✓						
500g	±0.3g	499.9	✓		500.0	✓						
1000g	±0.3g	999.9	✓		1000.0	✓						
2000g	±0.3g	1999.7	✓		2000.0	✓						
CORNERLOAD WEIGHT:		1000g			TOLERANCE:		±0.3g					
	A	in	out	B	in	out	C	in	out	D	in	out
BEFORE READING	0.0	✓		-0.1	✓		0.0	✓		0.0	✓	
AFTER READING	0.0	✓		-0.1	✓		0.0	✓		0.0	✓	
WEIGHT SET NUMBER	A500120											
TRACEABILITY NUMBER	2710662											
NEXT CALIBRATION DUE	December-20											
CALIBRATION DATE	23-Dec-2019											
TECHNICIAN SIGNATURE	<i>Susan A. Levo</i>											

CALIBRATION SITE: ___ Customer Site Laboratory ___ Other

CALIBRATION METHOD: Manufacturer's Procedure ___ Other

ISO/IEC 17025: ___ Compliant ___ Non-compliant Not Applicable

ENVIRONMENT: ___ Excellent Good ___ Fair ___ Poor

NOTES: _____

The calibrations within this certificate are traceable through NIST to the International System of Units (SI).

QF 175.10.1, Sheet 49 Rev. 5

This certificate shall not be reproduced, except in full, without written approval of Alpha-Liberty Company, Inc.

CONTINUOUS EMISSION MONITORS CALIBRATION STANDARDS

The calibration gases used for the calibration of the continuous gas analyzers must be within +/- 1 percent of the certified gas value. EQM calibration standards follow the Environmental Protection Agency Traceability Protocol Number 1. The calibration gas certifications used for this study are attached.



Praxair Distribution, Inc,
 6055 Brent Drive
 Toledo, OH 43611
 Tel: (419) 729-7732 Fax:(419) 729-2411
 PGVP ID: F12017

DocNumber: 000025050

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG WILMINGTON OH
 105 PRAXAIR WAY
 WILMINGTON OH 45177-

Praxair Order Number: 70353147
 Customer P. O. Number:
 Customer Reference Number:

Fill Date: 8/28/2017
 Part Number: AI ME85ME-AS
 Lot Number: 70001724002
 Cylinder Style & Outlet: AS CGA 590
 Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	9/5/2025	NIST Traceable
Cylinder Number:	ALM058118	Analytical Uncertainty:
85.5 ppm	METHANE	± 0.5 %
Balance	AIR	

Certification Information: Certification Date: 9/5/2017 Term: 96 Months Expiration Date: 9/5/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

OXYGEN = 20.9%

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE


Requested Concentration: 85.0 ppm
 Certified Concentration: 85.5 ppm
 Instrument Used: 2030
 Analytical Method: FOURIER-TRANSFORM INFRAR
 Last Multipoint Calibration: 9/1/2017

Reference Standard Type: GMIS
 Ref. Std. Cylinder #: CC99733
 Ref. Std. Conc: 101.5
 Ref. Std. Traceable to SRM #: 2751
 SRM Sample #: 212-C-04
 SRM Cylinder #: FF23181

First Analysis Data:		Date:		9/5/2017			
Z:	0	R:	104	C:	87.6	Conc:	85.494
R:	104	Z:	0	C:	87.5	Conc:	85.397
Z:	0	C:	87.6	R:	104	Conc:	85.494
UOM:	PPM	Mean Test Assay:	85.482 PPM				

Second Analysis Data:		Date:					
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	PPM	Mean Test Assay:	0 PPM				

Analyzed by:


 Mike Monnette

Certified by:


 Rolonda Kaywood

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	ENVIRONMENTAL QUALITY MANAGEMENT				
Part Number:	E02AI99E15A0077	Reference Number:	32-400693188-1		
Cylinder Number:	CC469660	Cylinder Volume:	146.2 CF		
Laboratory:	MIC - Royal Oak-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG		
PGVP Number:	B62016	Valve Outlet:	590		
Gas Code:	CH4,BALA	Certification Date:	Mar 30, 2016		

Expiration Date: Mar 30, 2024

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
METHANE AIR	47.00 PPM Balance	46.65 PPM	G1	+/- 0.4% NIST Traceable	03/30/2016

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15060918	CC462651	49.67 PPM METHANE/AIR	+/-0.3%	Jul 28, 2021

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 CH4	FTIR	Mar 03, 2016

Triad Data Available Upon Request



Approved for Release



Praxair Distribution, Inc,
 6055 Brent Drive
 Toledo, OH 43611
 Tel: (419) 729-7732 Fax:(419) 729-2411
 PGVP ID: F12017

DocNumber: 000025047

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR PKG WILMINGTON OH
 105 PRAXAIR WAY
 WILMINGTON OH 45177-

Praxair Order Number: 70353147
 Customer P. O. Number:
 Customer Reference Number:

Fill Date: 8/28/2017
 Part Number: AI ME27ME-AS
 Lot Number: 70001724003
 Cylinder Style & Outlet: AS CGA 590
 Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	9/5/2025	NIST Traceable
Cylinder Number:	CC118308	Analytical Uncertainty:
27.4 ppm METHANE		± 0.5 %
Balance AIR		

Certification Information: Certification Date: 9/5/2017 Term: 96 Months Expiration Date: 9/5/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
 Do Not Use this Standard if Pressure is less than 100 PSIG.

OXYGEN = 20.9%

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE

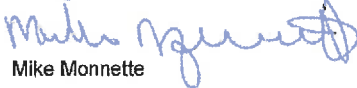
Requested Concentration: 27.0 ppm
 Certified Concentration: 27.4 ppm
 Instrument Used: 2030
 Analytical Method: FOURIER-TRANSFORM INFRAR
 Last Multipoint Calibration: 9/1/2017

Reference Standard Type: GMIS
 Ref. Std. Cylinder #: CC106483
 Ref. Std. Conc: 50.7
 Ref. Std. Traceable to SRM #: 2750
 SRM Sample #: 211-C-11
 SRM Cylinder #: FF23126

First Analysis Data:				Date:	9/5/2017
Z:	0	R:	52	C:	28
Conc:	27.3				
R:	52	Z:	0	C:	28.1
Conc:	27.398				
Z:	0	C:	28.1	R:	52
Conc:	27.398				
UOM:	PPM	Mean Test Assay:	27.365 PPM		

Second Analysis Data:				Date:	
Z:	0	R:	0	C:	0
Conc:	0				
R:	0	Z:	0	C:	0
Conc:	0				
Z:	0	C:	0	R:	0
Conc:	0				
UOM:	PPM	Mean Test Assay:	0 PPM		

Analyzed by:


 Mike Monnette

Certified by:


 Rolonda Kaywood



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

ENVIRONMENTAL QUALITY MANAGEMENT
 1800 CARILLON BLVD
 CINCINNATI OH 45240

Certificate Issuance Date: 12/10/2019
 Praxair Order Number: 91516582
 Pail Number: NI NX50ME-AS
 Customer PC Number: 022768

Fill Date: 12/02/2019
 Lot Number: 70086933606
 Cylinder Style & Outlet: AS CGA 660
 Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Expiration Date:	12/17/2020	NIST Traceable
Cylinder Number:	CC441000	Expanded Uncertainty
49.2 ppm	Nitrogen dioxide (as NOx)	± 2.0 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 12/17/2019 Term: 12 Months Expiration Date: 12/17/2020

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
 Do Not Use this Standard If Pressure is less than 100 PSIG.
 This mixture contains 2% Oxygen.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Nitrogen dioxide (as NOx)
 Requested Concentration: 50 ppm
 Certified Concentration: 49.2 ppm
 Instrument Used: MKS Multigas 2031 FTIR
 Analytical Method: FTIR
 Last Multipoint Calibration: 11/26/2019

Reference Standard: Type / Cylinder #: GMIS / GN0009636
 Concentration / Uncertainty: 51.38 ppm ±2%
 Expiration Date: 08/12/2020
 Traceable to: SRM # / Sample # / Cylinder #: PRM#D685005 / N/A / PRM#D685005
 SRM Concentration / Uncertainty: 50.0 ppm / ±1.0 ppm
 SRM Expiration Date: 08/21/2019

First Analysis Data:				Date			
Z:	0	R:	51.4	C:	49.2	Conc:	49.2
R:	51.3	Z:	0	C:	49.1	Conc:	49.1
Z:	0	C:	49.2	R:	51.4	Conc:	49.2
UOM:	ppm	Mean Test Assay:	49.2	ppm			

Second Analysis Data:				Date			
Z:	0	R:	51.6	C:	49.4	Conc:	49.3
R:	51.4	Z:	0	C:	49.2	Conc:	49.1
Z:	0	C:	49.2	R:	51.4	Conc:	49.1
UOM:	ppm	Mean Test Assay:	49.2	ppm			

Analyzed By

Leeanna Flores

Certified By

Henry Koung



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
 8376 READING RD
 CINCINNATI OH 45237

Certificate Issuance Date: 03/06/2019

Praxair Order Number: 70877910

Part Number: NI NO90ME-AS

Fill Date: 02/14/2019

Lot Number: 700019045WC

Cylinder Style & Outlet: AS CGA 660
 Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Expiration Date:	03/06/2027	NIST Traceable
Cylinder Number:	SA5083	Expanded Uncertainty
91.2 ppm	Nitric oxide	± 0.8 %
Balance	Nitrogen	

ProSpec EZ Cert



For Reference Only: NOx 91.3 ppm

Certification Information: Certification Date: 03/06/2019 Term: 96 Months Expiration Date: 03/06/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
 Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Nitric oxide
 Requested Concentration: 90 ppm
 Certified Concentration: 91.2 ppm
 Instrument Used: Thermo-42i LS
 Analytical Method: Chemiluminescence
 Last Multipoint Calibration: 02/12/2019

Reference Standard: Type / Cylinder #: NTRM / CC335718
 Concentration / Uncertainty: 100.4 ppm ±0.7968%
 Expiration Date: 07/10/2021
 Traceable to: SRM # / Sample # / Cylinder #: NTRM#17074 / N/A / NTRM#17074
 SRM Concentration / Uncertainty: 100.4 / .007968
 SRM Expiration Date: 07/10/2021

First Analysis Data:				Date
Z: 0	R: 100.4	C: 91.3	Conc: 91.3	02/27/2019
R: 100.4	Z: 0	C: 91.2	Conc: 91.2	
Z: 0	C: 91.2	R: 100.3	Conc: 91.2	
UOM: ppm				Mean Test Assay: 91.3 ppm

Second Analysis Data:				Date
Z: 0	R: 100.4	C: 91.3	Conc: 91.3	03/06/2019
R: 100.3	Z: 0	C: 91	Conc: 91	
Z: 0	C: 91.1	R: 100.4	Conc: 91.1	
UOM: ppm				Mean Test Assay: 91.2 ppm

Analyzed By

Jesse L Glass

Certified By

Edward E Zucal



Making our planet more productive

DocNumber: 237593



Praxair Distribution, Inc.
6055 Brent Drive
Toledo OH 43611
Tel: +1 (419) 729-7732
Fax: +1 (419) 729-2411
PGVP ID: F12019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
8376 READING RD
CINCINNATI OH 45237

Certificate Issuance Date: 03/26/2019

Praxair Order Number: 70884883

Part Number: NI NO46ME-AS

Fill Date: 03/13/2019

Lot Number: 700019072D4

Cylinder Style & Outlet: AS

CGA 660

Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Table with 3 columns: Parameter, Value, and Note. Includes Expiration Date (03/26/2022), Cylinder Number (DT0027966), Certified Concentration (46.0 ppm), and Balance (Nitrogen).

ProSpec EZ Cert



For Reference Only: NOx 46.3 ppm

Certification Information: Certification Date: 03/26/2019 Term: 36 Months Expiration Date: 03/26/2022

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component:

Nitric oxide

Requested Concentration: 46 ppm
Certified Concentration: 46.0 ppm
Instrument Used: Thermo-42i LS
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 03/12/2019

Reference Standard: Type / Cylinder #: GMIS / CC221457
Concentration / Uncertainty: 48.65 ppm ±0.253%
Expiration Date: 11/16/2020
Traceable to: SRM # / Sample # / Cylinder #: PRM#C1303210.02 / N/A / APEX1223947
SRM Concentration / Uncertainty: 50.07 / ±20
SRM Expiration Date: 08/11/2018

Table with 4 columns: Parameter, Value, Date, and Conc. Includes First Analysis Date (03/19/2019) and UOM (ppm).

Table with 4 columns: Parameter, Value, Date, and Conc. Includes Second Analysis Date (03/26/2019) and UOM (ppm).

Analyzed By

Jesse L. Glass (signature)

Certified By

Edward E. Zucal (signature)

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose.



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
8376 READING RD
CINCINNATI OH 45237-1407

Certificate Issuance Date: 03/18/2020

Praxair Order Number: 71279555

Part Number: NI CD22015E-AS

Customer PO Number: 79269055

Fill Date: 03/11/2020

Lot Number: 700010071F4

Cylinder Style & Outlet: AS

CGA 590

Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

Expiration Date:	03/17/2028	NIST Traceable
Cylinder Number:	CC123685	Expanded Uncertainty
22.0 %	Carbon dioxide	± 1.2 %
11.0 %	Oxygen	± 0.3 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 03/17/2020

Term: 96 Months

Expiration Date: 03/17/2028

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G2.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Carbon dioxide
Requested Concentration: 22.0 %
Certified Concentration: 22.0 %
Instrument Used: MKS 2030
Analytical Method: FTIR
Last Multipoint Calibration: 02/27/2020

First Analysis Data:				Date			
Z:	0	R:	17.6	C:	19.2	Conc:	21.9
R:	17.7	Z:	0	C:	19.3	Conc:	22.1
Z:	0	C:	19.3	R:	17.7	Conc:	22.1
UOM:	%	Mean Test Assay:		22	%		

Reference Standard: Type / Cylinder #: GMIS / CC275942
Concentration / Uncertainty: 20.19 % ±0.24%
Expiration Date: 01/13/2026
Traceable to: SRM # / Sample # / Cylinder #: PRM# 3222577.01 / n/a / FF27613
SRM Concentration / Uncertainty: 20.008% / ±0.028%
SRM Expiration Date: 04/01/2020

Second Analysis Data:				Date			
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%	Mean Test Assay:			%		

2. Component: Oxygen
Requested Concentration: 11.0 %
Certified Concentration: 11.0 %
Instrument Used: Servomex 575
Analytical Method: Paramagnetic
Last Multipoint Calibration: 02/20/2020

First Analysis Data:				Date			
Z:	0	R:	22.51	C:	11	Conc:	11
R:	22.51	Z:	0	C:	11	Conc:	11
Z:	0	C:	11	R:	22.52	Conc:	11
UOM:	%	Mean Test Assay:		11	%		

Reference Standard: Type / Cylinder #: GMIS / EB0008354
Concentration / Uncertainty: 22.51 % ±0.3%
Expiration Date: 11/17/2025
Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-D-04 / CAL015785
SRM Concentration / Uncertainty: 20.72 / ±0.043
SRM Expiration Date: 08/23/2021

Second Analysis Data:				Date			
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%	Mean Test Assay:			%		

Analyzed By

Mike Monette

Certified By

Edward E Zuca



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
8376 READING RD
CINCINNATI OH 45237-1407

Certificate Issuance Date: 03/19/2020

Praxair Order Number: 71279555

Part Number: NI CD11015E-AS

Customer PO Number: 79269055

Fill Date: 03/11/2020

Lot Number: 700010071F5

Cylinder Style & Outlet: AS

CGA 590

Cylinder Pressure and Volume: 2000 psig

149 ft3

Certified Concentration

Expiration Date:	03/19/2028	NIST Traceable
Cylinder Number:	CC700755	Expanded Uncertainty
11.0 %	Carbon dioxide	± 0.3 %
22.0 %	Oxygen	± 0.3 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 03/19/2020

Term: 96 Months

Expiration Date: 03/19/2028

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component:

Carbon dioxide

Requested Concentration: 11.0 %
Certified Concentration: 11.0 %
Instrument Used: MKS 203D
Analytical Method: FTIR
Last Multipoint Calibration: 02/27/2020

Reference Standard:

Type / Cylinder #: GMIS / EB0054692

Concentration / Uncertainty: 15.05 % ±0.27%

Expiration Date: 09/02/2026

Traceable to: SRM # / Sample # / Cylinder #: 2745 / 9-C-03 / CAL016000

SRM Concentration / Uncertainty: 15.633% / ±0.037%

SRM Expiration Date: 02/07/2025

First Analysis Data:				Date			
Z:	0	R:	15.42	C:	11.24	Conc:	11
R:	15.42	Z:	0	C:	11.24	Conc:	11
Z:	0	C:	11.24	R:	15.43	Conc:	11
UOM:	%	Mean Test Assay:		11	%		

Second Analysis Data:				Date			
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%	Mean Test Assay:			%		

2. Component:

Oxygen

Requested Concentration: 22.0 %
Certified Concentration: 22.0 %
Instrument Used: Servomex 575
Analytical Method: Paramagnetic
Last Multipoint Calibration: 02/20/2020

Reference Standard:

Type / Cylinder #: GMIS / EB0008354

Concentration / Uncertainty: 22.51 % ±0.3%

Expiration Date: 11/17/2025

Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-D-04 / CAL015785

SRM Concentration / Uncertainty: 20.72 / ±0.043

SRM Expiration Date: 08/23/2021

First Analysis Data:				Date			
Z:	0	R:	22.53	C:	22.03	Conc:	22
R:	22.52	Z:	0	C:	22.03	Conc:	22
Z:	0	C:	22.04	R:	22.53	Conc:	22
UOM:	%	Mean Test Assay:		22	%		

Second Analysis Data:				Date			
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%	Mean Test Assay:			%		

Analyzed By

Lloyd Knapp

Certified By

Edward E Zucal



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
 8376 READING RD
 CINCINNATI OH 45237

Certificate Modification Date: 10/06/2018
 Praxair Order Number: 70741273
 Part Number: NI CO190E-AS

Fill Date: 09/26/2018
 Lot Number: 70901826958
 Cylinder Style & Outlet: AS CGA 350
 Cylinder Pressure and Volume: 2000 psig 140 f33

Certified Concentration

Expiration Date:	10/04/2026	NIST Traceable
Cylinder Number:	SA5340	Expanded Uncertainty
191 ppm	Carbon monoxide	± 0.4 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 10/04/2018

Term: 96 Months

Expiration Date: 10/04/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
 Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. **Component:** Carbon monoxide
 Requested Concentration: 190 ppm
 Certified Concentration: 191 ppm
 Instrument Used: Horiba VIA 510
 Analytical Method: NDIR
 Last Multipoint Calibration: 10/04/2018

Reference Standard: Type / Cylinder #: GMIS / EB0005134
 Concentration / Uncertainty: 250.6 ppm ±0.3%
 Expiration Date: 03/18/2026
Traceable to: SRM # / Sample # / Cylinder #: 2636a / 57-F-15 / FF30792
 SRM Concentration / Uncertainty: 247.1 PPM / ±0.5 PPM
 SRM Expiration Date: 03/26/2018

First Analysis Data:				Date				
Z:	0	R:	250.6	C:	191.2	Conc:	191	10/04/2018
R:	250.5	Z:	0	C:	191.3	Conc:	191	
Z:	0	C:	191.2	R:	250.6	Conc:	191	
UOM:	ppm	Mean Test Assay:		191	ppm			

Second Analysis Data:				Date				
Z:	0	R:	0	C:	0	Conc:	0	
R:	0	Z:	0	C:	0	Conc:	0	
Z:	0	C:	0	R:	0	Conc:	0	
UOM:	ppm	Mean Test Assay:			ppm			

Analyzed By

Mike Monette
 Mike Monette

Certified By

Edward E. Zucal
 Edward E. Zucal



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG CINCINNATI OH HP
8376 READING RD
CINCINNATI OH 45237

Certificate Modification Date: 10/06/2018

Praxair Order Number: 70741273

Part Number: NI CO90ME-AS

Fill Date: 09/26/2018

Lot Number: 700018269S9

Cylinder Style & Outlet: AS

CGA 350

Cylinder Pressure and Volume: 2000 psig 140 f3

Certified Concentration

Expiration Date:	10/04/2026	NIST Traceable
Cylinder Number:	CC86523	Expanded Uncertainty
90.1 ppm	Carbon monoxide	± 0.3 %
Balance	Nitrogen	

ProSpec EZ Cert



Certification Information:

Certification Date: 10/04/2018

Term: 96 Months

Expiration Date: 10/04/2026

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. **Component:** Carbon monoxide
Requested Concentration: 90.0 ppm
Certified Concentration: 90.1 ppm
Instrument Used: Horiba VIA 510
Analytical Method: NDIR
Last Multipoint Calibration: 10/04/2018

Reference Standard: Type / Cylinder #: GMIS / DT0010979
Concentration / Uncertainty: 100.5 ppm ±0.231%
Expiration Date: 07/05/2026
Traceable to: SRM # / Sample # / Cylinder #: 1679c / 03-K-60 / FF25429
SRM Concentration / Uncertainty: 98.28 PPM / ±0.21 PPM
SRM Expiration Date: 09/25/2022

First Analysis Data:				Date			
Z:	0	R:	100.5	C:	90.1	Conc:	90.1
R:	100.5	Z:	0	C:	90.2	Conc:	90.2
Z:	0	C:	90.1	R:	100.5	Conc:	90.1
UOM: ppm		Mean Test Assay:		90.1	ppm		

Second Analysis Data:				Date			
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM: ppm		Mean Test Assay:			ppm		

Analyzed By

Mike Monnette

Certified By

Edward E Zucal

APPENDIX E
PROCESS DATA

AK Steel Dearborn Works
2020 Baghouse Stack Test Process Data
C Blast Furnace Production Data
August 13, 2020

Date 8/13/2020
 Test Run 1

Test Start Time: 6:51 AM End Time: 8:18 AM

Cast No.	Cast Start Time	Slag Start Time	Cast End Time	Iron Rate (ton/min)	Iron Time ¹ (minutes)	Slag Rate (ton/min)	Slag Time ¹ (minutes)	Iron Cast (tons)	Slag (tons)
CE201020	6:51 AM	7:29 AM	8:17 AM	6.90	87	2.04	49	600.00	100.00
Total (tons)								600.00	100.00
Time (min)								87	
Iron Production Rate (ton/hr)								413.8	

¹ Iron and Slag "Time" is the duration that occurred once casting started

Date 8/13/2020
 Test Run 2

Test Start Time: 10:37 AM End Time: 12:26 PM Paused 17:01 - 17:11

Cast No.	Cast Start Time	Slag Start Time	Cast End Time	Iron Rate (ton/min)	Iron Time ¹ (minutes)	Slag Rate (ton/min)	Slag Time ¹ (minutes)	Iron Cast (tons)	Slag (tons)
CE201022	10:42 AM	10:59 AM	12:18 PM	4.64	97	1.88	80	450.00	150.00
Total (tons)								450.00	150.00
Time (min)								110	
Iron Production Rate (ton/hr)								245.5	

¹ Iron and Slag "Time" is the duration that occurred once casting started

Date 8/13/2020
 Test Run 3

Test Start Time: 3:13 PM End Time: 5:25 PM Paused 12:32 - 13:36

Cast No.	Cast Start Time	Slag Start Time	Cast End Time	Iron Rate (ton/min)	Iron Time ¹ (minutes)	Slag Rate (ton/min)	Slag Time ¹ (minutes)	Iron Cast (tons)	Slag (tons)
CE201024	3:19 PM	3:25 PM	5:24 PM	4.76	126	1.33	120	600.00	160.00
Total (tons)								600.00	160.00
Time (min)								133	
Iron Production Rate (ton/hr)								270.7	

¹ Iron and Slag "Time" is the duration that occurred once casting started

Date 8/13/2020
 Test Run 4

Test Start Time: 5:38 PM End Time: 7:38 PM

Cast No.	Cast Start Time	Slag Start Time	Cast End Time	Iron Rate (ton/min)	Iron Time ¹ (minutes)	Slag Rate (ton/min)	Slag Time ¹ (minutes)	Iron Cast (tons)	Slag (tons)
CN201025	5:39 PM	6:45 PM	7:38 PM	5.00	120	1.85	54	600.00	100.00
Total (tons)								600.00	100.00
Time (min)								121	
Iron Production Rate (ton/hr)								297.5	

¹ Iron and Slag "Time" is the duration that occurred once casting started

Run 2, 3, and 4 Average 271.2 tph
Daily Production 5971 tons

C-Blast Furnace Casthouse and Baghouse Inlet Pressures and Damper Positions														
Time	Scenario	Comments	North Activity	East Activity Drill/Transition	Inlet Pressure (B052)	North Slag South (B041)	North Slag North (B042)	North Iron Tiller (B043)	North Taphole (B044)	East Slag North (B051)	East Slag South (B052)	East Iron West (B052A)	East Iron East (B052B)	East Taphole (B054)
8/13/2020 6:52	1	Run 1	Idle	Drill/Transition	-4.5	0	0	0	4	0	0	0	0	100
8/13/2020 7:02	3	Run 1	Idle	Cast	-3.5	0	0	0	0	0	0	0	0	100
8/13/2020 7:12	2	Run 1	Idle	Cast	-3.1	0	0	0	0	0	0	0	0	100
8/13/2020 7:22	3	Run 1	Idle	Cast	-3.2	0	0	0	0	0	0	0	0	100
8/13/2020 7:32	6	Run 1	Idle	Slag	-3.0	0	0	0	0	0	0	0	0	100
8/13/2020 7:42	6	Run 1	Idle	Slag	-3.0	0	0	0	0	0	0	0	0	100
8/13/2020 7:52	7	Run 1	Idle	Slag transition	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 8:02	6	Run 1	Idle	Slag	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 8:12	6	Run 1	Idle	Slag	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 8:22	6	Run 1	Idle	Slag	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 8:32	4	Run 1	Idle	PLUGGED	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 8:42	4	Run 1	Idle	PLUGGED	-2.9	0	0	0	0	0	0	0	0	100
8/13/2020 10:37	1	Run 2	Idle	Drill	-8.1	0	0	0	0	0	0	0	0	100
8/13/2020 10:47	3	Run 2	Idle	Cast	-3.7	0	0	0	0	0	0	0	0	100
8/13/2020 10:57	3	Run 2	Idle	Cast	-3.7	0	0	0	0	0	0	0	0	100
8/13/2020 11:07	7	Run 2	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 11:17	7	Run 2	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 11:27	9	Run 2	Idle	Slag	-7.5	0	0	0	0	0	0	0	0	100
8/13/2020 11:37	9	Run 2	Idle	Slag	-7.3	0	0	0	0	0	0	0	0	100
8/13/2020 11:47	7	Run 2	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 11:57	8	Run 2	Idle	Slag	-7.2	0	0	0	0	0	0	0	0	100
8/13/2020 12:07	8	Run 2	Idle	Slag	-7.1	0	0	0	0	0	0	0	0	100
8/13/2020 12:17	6	Run 2	Idle	Slag	-7.2	0	0	0	0	0	0	0	0	100
8/13/2020 12:27	2	Run 2	Idle	Slag	-3.6	0	0	0	0	0	0	0	0	100
8/13/2020 15:13	1	Run 3	Idle	Drill	-8.5	0	0	0	0	0	0	0	0	100
8/13/2020 15:23	2	Run 3	Idle	Cast	-3.7	0	0	0	0	0	0	0	0	100
8/13/2020 15:33	6	Run 3	Idle	Slag	-7.6	0	0	0	0	0	0	0	0	100
8/13/2020 15:43	6	Run 3	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 15:53	6	Run 3	Idle	Slag	-7.5	0	0	0	0	0	0	0	0	100
8/13/2020 16:03	8	Run 3	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 16:13	8	Run 3	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 16:23	6	Run 3	Idle	Slag	-7.3	0	0	0	0	0	0	0	0	100
8/13/2020 16:33	6	Run 3	Idle	Slag	-7.3	0	0	0	0	0	0	0	0	100
8/13/2020 16:43	6	Run 3	Idle	Slag	-7.3	0	0	0	0	0	0	0	0	100
8/13/2020 16:53	5	Run 3	Idle	Slag	-7.3	0	0	0	0	0	0	0	0	100
8/13/2020 17:03	7	Run 3	Idle	Slag	-7.5	0	0	0	0	0	0	0	0	100
8/13/2020 17:13	7	Run 3	Idle	Slag	-7.4	0	0	0	0	0	0	0	0	100
8/13/2020 17:23	8	Run 3	Idle	Slag	-7.1	0	0	0	0	0	0	0	0	100
8/13/2020 17:33	8	Run 3	Idle	Slag	-7.0	0	0	0	0	0	0	0	0	100
8/13/2020 17:43	8	Run 3	Idle	Slag	-7.0	0	0	0	0	0	0	0	0	100
8/13/2020 17:53	8	Run 3	Idle	Slag	-7.0	0	0	0	0	0	0	0	0	100
8/13/2020 17:58	10	Run 4	Drill	Idle	-6.0	0	0	0	100	0	0	0	0	2
8/13/2020 17:58	12	Run 4	Cast	Idle	-8.0	0	0	0	65	0	0	0	0	2
8/13/2020 17:58	12	Run 4	Cast	Idle	-8.0	0	0	0	65	0	0	0	0	2
8/13/2020 18:08	12	Run 4	Cast	Idle	-8.0	0	0	0	65	0	0	0	0	2
8/13/2020 18:18	12	Run 4	Cast	Idle	-7.9	0	0	0	65	0	0	0	0	2
8/13/2020 18:28	12	Run 4	Cast	Idle	-7.9	0	0	0	65	0	0	0	0	2
8/13/2020 18:38	12	Run 4	Cast	Idle	-7.9	0	0	0	65	0	0	0	0	2
8/13/2020 18:48	14	Run 4	Slag	Idle	-8.3	0	0	0	65	0	0	0	0	2
8/13/2020 18:58	14	Run 4	Slag	Idle	-4.8	30	0	0	100	0	0	0	0	2
8/13/2020 19:08	14	Run 4	Slag	Idle	-4.8	30	0	0	100	0	0	0	0	2
8/13/2020 19:18	14	Run 4	Slag	Idle	-4.7	30	0	0	100	0	0	0	0	2
8/13/2020 19:28	14	Run 4	Slag	Idle	-4.7	30	0	0	100	0	0	0	0	2
8/13/2020 19:38	13	Run 4	Slag	Idle	-4.9	0	30	0	100	0	0	0	0	2

C-Blast Furnace Baghouse Bag Leak Detector Readings

Time (EDT)	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Compt. 1	Overall	Run
8/13/2020 6:51	0.01	0.05	0.01	0.07	0.07	0.06	0.06	0.04	0.35	-0.01	-0.03	1
8/13/2020 6:52	0.01	0.05	0.00	0.06	0.09	0.06	0.06	0.05	0.35	0.01	-0.01	1
8/13/2020 7:02	0.01	0.05	0.00	0.08	0.17	0.21	0.07	0.05	0.35	0.12	0.18	1
8/13/2020 7:12	0.01	0.05	0.02	0.07	0.09	0.06	0.05	0.18	0.35	0.03	0.05	1
8/13/2020 7:22	0.01	0.04	0.03	0.05	0.07	0.05	0.04	0.03	0.35	1.43	0.80	1
8/13/2020 7:32	0.01	0.04	0.02	0.06	0.08	0.06	0.04	0.03	0.35	0.03	0.01	1
8/13/2020 7:42	0.01	0.04	0.04	0.05	0.07	0.05	0.03	0.03	0.35	0.02	0.00	1
8/13/2020 7:52	0.02	0.04	0.05	0.05	0.08	0.05	0.03	0.04	0.35	0.03	0.01	1
8/13/2020 8:02	0.02	0.04	0.06	0.05	0.08	0.05	0.02	0.03	0.35	0.02	-0.01	1
8/13/2020 8:12	0.02	0.05	0.09	0.04	0.15	0.04	0.03	0.06	0.35	0.04	0.04	1
8/13/2020 8:18	0.02	0.04	0.11	0.04	0.12	0.05	0.03	0.03	0.35	0.03	-0.01	1
8/13/2020 10:37	0.04	0.03	0.06	0.06	0.41	0.07	0.04	0.04	0.35	0.04	0.05	2
8/13/2020 10:47	0.04	0.08	0.02	0.07	0.08	0.06	0.06	0.05	0.35	0.01	-0.01	2
8/13/2020 10:57	0.05	0.08	0.03	0.08	0.07	0.06	0.07	0.02	0.35	0.28	0.21	2
8/13/2020 11:07	0.05	0.08	0.05	0.07	0.10	0.05	0.05	0.04	0.35	0.05	0.01	2
8/13/2020 11:17	0.05	0.08	0.04	0.06	0.13	0.05	0.04	0.06	0.36	0.18	0.11	2
8/13/2020 11:27	0.05	0.06	0.04	0.06	0.19	0.05	0.04	0.03	0.35	0.15	0.06	2
8/13/2020 11:37	0.06	0.04	0.05	0.05	0.20	0.04	0.05	0.03	0.36	0.51	0.24	2
8/13/2020 11:47	0.05	0.04	0.10	0.06	0.21	0.04	0.03	0.04	0.36	0.25	0.24	2
8/13/2020 11:57	0.05	0.07	0.06	0.42	0.18	0.05	0.04	0.03	0.36	0.09	0.09	2
8/13/2020 12:07	0.06	0.06	0.07	0.04	0.39	0.06	0.06	0.04	0.37	0.12	0.12	2
8/13/2020 12:17	0.06	0.08	0.07	0.05	0.32	0.18	0.18	0.11	0.37	0.24	0.21	2
8/13/2020 12:27	0.08	0.10	0.04	0.08	0.08	0.06	0.08	0.03	0.36	0.23	0.14	2
8/13/2020 15:13	0.11	0.09	0.05	0.09	0.10	0.07	0.07	0.06	0.43	7.42	2.58	3
8/13/2020 15:23	0.04	0.14	0.07	0.11	0.15	0.08	0.12	0.04	0.36	0.01	-0.02	3
8/13/2020 15:33	0.05	0.10	0.00	0.10	0.12	0.07	0.06	0.03	0.36	0.04	0.00	3
8/13/2020 15:43	0.04	0.09	0.01	0.12	0.09	0.05	0.06	0.04	0.36	0.09	0.04	3
8/13/2020 15:53	0.04	0.10	0.01	0.08	0.08	0.07	0.07	0.04	0.36	0.09	0.06	3
8/13/2020 16:03	0.05	0.10	0.00	0.07	0.09	0.06	0.05	0.03	0.36	0.02	0.03	3
8/13/2020 16:13	0.05	0.10	0.01	0.07	0.09	0.06	0.06	0.03	0.35	0.04	0.01	3
8/13/2020 16:23	0.05	0.08	0.02	0.07	0.08	0.04	0.03	0.07	1.53	0.10	2.15	3
8/13/2020 16:33	0.06	0.07	0.02	0.07	0.09	0.05	0.03	0.03	0.36	0.72	0.94	3
8/13/2020 16:43	0.07	2.12	0.05	0.10	0.10	0.06	0.09	0.04	0.35	0.07	0.45	3
8/13/2020 16:53	0.05	0.08	0.02	0.39	0.10	0.04	0.04	0.04	0.35	0.05	0.03	3
8/13/2020 17:03	0.05	0.09	0.02	0.06	0.10	0.15	0.06	0.04	0.36	0.01	0.02	3
8/13/2020 17:13	0.05	0.09	0.04	0.05	0.21	0.04	0.09	0.92	0.37	0.05	0.09	3
8/13/2020 17:23	0.07	0.08	0.05	0.05	0.28	0.05	0.05	0.10	0.36	0.30	0.20	3
8/13/2020 17:25	0.06	0.07	0.07	0.05	0.31	0.08	0.07	0.06	0.37	0.24	0.08	3
8/13/2020 17:39	0.06	0.09	0.01	0.13	0.25	0.06	0.08	0.07	0.35	0.09	0.08	4
8/13/2020 17:49	0.07	0.09	0.03	0.07	0.15	0.05	0.08	0.06	0.35	0.04	0.03	4
8/13/2020 17:59	0.07	0.08	0.05	0.06	0.12	0.06	0.08	0.06	0.35	0.04	0.04	4
8/13/2020 18:09	0.07	0.09	0.05	0.07	0.08	0.06	0.08	0.03	0.36	0.02	0.00	4
8/13/2020 18:19	0.07	0.09	0.06	0.07	0.08	0.07	0.07	0.03	0.36	0.02	0.01	4
8/13/2020 18:29	0.08	0.09	0.05	0.07	0.08	0.05	0.06	0.64	0.38	0.03	0.05	4
8/13/2020 18:39	0.08	0.09	0.05	0.07	0.09	0.06	0.07	0.03	0.36	0.09	0.04	4
8/13/2020 18:49	0.08	0.08	0.13	0.08	0.12	0.04	0.05	0.05	0.36	0.06	0.02	4
8/13/2020 18:59	0.06	0.09	0.03	0.07	0.13	0.06	0.07	0.05	0.36	0.03	0.01	4
8/13/2020 19:09	0.07	0.11	0.04	0.08	0.10	0.04	2.08	0.07	0.36	0.02	0.91	4
8/13/2020 19:19	0.06	0.10	0.04	0.08	0.17	0.05	0.05	0.08	0.46	0.04	0.38	4
8/13/2020 19:29	0.09	1.21	0.05	0.08	0.09	0.05	0.08	0.04	0.36	0.03	0.07	4
8/13/2020 19:38	0.07	0.10	0.05	0.08	0.38	0.05	0.07	0.12	0.37	0.14	0.17	4

C-Blast Furnace Baghouse Individual Compartment and Overall Pressure Drop

Time (EDT)	Overall DP	Compt. 1 DP	Compt. 2 DP	Compt. 3 DP	Compt. 4 DP	Compt. 5 DP	Compt. 6 DP	Compt. 7 DP	Compt. 8 DP	Compt. 9 DP	Compt. 10 DP	Run
8/13/2020 6:51	6.21	0.54	2.22	4.14	0.80	1.16	4.24	0.82	3.28	1.82	2.04	1
8/13/2020 6:52	5.82	3.35	4.71	4.01	3.73	4.22	4.04	3.52	6.32	4.78	5.06	1
8/13/2020 7:02	5.74	2.06	3.08	3.78	2.53	1.90	3.14	2.13	4.40	3.07	3.28	1
8/13/2020 7:12	6.23	4.11	4.16	4.24	4.28	4.00	3.72	3.88	1.10	5.01	5.08	1
8/13/2020 7:22	5.86	4.35	4.04	4.04	4.41	3.93	3.62	4.04	4.93	4.42	0.50	1
8/13/2020 7:32	5.29	3.58	3.55	3.55	3.94	3.62	3.26	3.65	4.65	3.87	4.10	1
8/13/2020 7:42	5.43	3.15	3.59	3.64	3.81	3.39	3.38	3.28	4.71	3.70	4.42	1
8/13/2020 7:52	5.47	3.73	3.77	3.74	4.12	3.84	3.51	3.86	4.94	3.90	4.47	1
8/13/2020 8:02	5.48	3.88	3.88	3.81	4.32	3.96	3.62	4.02	5.10	3.94	4.74	1
8/13/2020 8:12	5.68	4.52	4.03	4.02	4.61	4.22	3.74	4.18	5.36	3.26	4.54	1
8/13/2020 8:18	5.79	4.59	4.16	4.08	4.75	4.28	3.81	4.49	5.43	4.78	4.99	1
8/13/2020 10:37	8.21	3.53	4.81	4.78	3.46	3.55	0.11	3.89	6.49	4.37	5.13	2
8/13/2020 10:47	6.27	2.08	3.73	3.80	2.59	3.17	3.67	2.81	1.09	4.56	4.54	2
8/13/2020 10:57	5.90	3.76	3.68	3.70	3.80	3.79	3.56	3.63	4.95	3.89	0.36	2
8/13/2020 11:07	9.17	5.43	4.81	4.89	5.06	5.03	4.96	4.95	6.57	5.30	6.20	2
8/13/2020 11:17	9.19	5.51	4.99	5.00	4.96	5.15	5.11	5.45	6.63	6.04	6.10	2
8/13/2020 11:27	9.27	5.66	5.09	5.21	5.11	5.31	5.34	5.61	6.55	6.16	6.31	2
8/13/2020 11:37	10.59	0.11	6.06	5.82	6.25	6.50	6.04	6.54	7.85	6.99	7.37	2
8/13/2020 11:47	10.39	5.83	5.16	0.50	6.24	6.24	6.11	6.45	7.81	6.84	7.51	2
8/13/2020 11:57	10.35	5.78	5.20	5.20	0.11	6.27	6.14	6.10	7.65	6.86	7.35	2
8/13/2020 12:07	10.47	6.13	5.45	5.44	6.16	7.09	0.12	6.64	8.14	7.24	7.84	2
8/13/2020 12:17	10.64	6.05	5.61	5.56	6.06	6.27	5.80	7.60	1.09	7.94	7.68	2
8/13/2020 12:27	6.23	3.50	3.77	3.82	3.98	4.13	3.92	3.79	5.20	4.12	0.19	2
8/13/2020 15:13	8.35	0.11	5.81	5.03	5.21	5.10	5.15	4.71	5.98	3.95	5.88	3
8/13/2020 15:23	6.18	1.97	3.41	0.55	2.90	3.27	3.93	1.39	4.85	3.35	3.46	3
8/13/2020 15:33	9.21	4.78	4.44	4.49	5.87	5.91	5.56	6.30	6.96	5.80	6.52	3
8/13/2020 15:43	10.36	6.16	5.35	5.12	0.11	6.70	6.09	6.70	7.85	7.17	7.45	3
8/13/2020 15:53	10.80	5.52	5.35	5.29	5.67	5.93	0.11	6.20	7.72	6.90	7.05	3
8/13/2020 16:03	9.26	4.85	4.72	4.81	5.03	5.11	4.97	5.29	7.08	5.69	6.49	3
8/13/2020 16:13	9.34	5.14	4.81	5.00	5.19	5.25	5.28	4.87	7.11	5.97	6.71	3
8/13/2020 16:23	10.66	6.00	5.50	5.90	6.04	6.17	6.09	5.93	7.36	0.09	7.71	3
8/13/2020 16:33	10.57	5.94	5.72	5.81	6.39	6.44	6.19	6.36	7.65	6.78	0.22	3
8/13/2020 16:43	11.13	6.39	0.15	5.89	6.24	6.13	6.22	6.07	7.75	6.41	6.91	3
8/13/2020 16:53	10.90	5.82	5.37	5.57	0.12	6.51	6.35	6.14	7.99	7.04	7.54	3
8/13/2020 17:03	9.36	5.29	4.86	5.07	5.34	5.46	4.97	6.06	7.45	6.71	6.95	3
8/13/2020 17:13	10.42	6.08	5.82	5.68	6.35	6.49	5.98	6.67	9.22	0.09	7.98	3
8/13/2020 17:23	10.46	0.11	5.82	5.91	6.86	6.88	6.14	7.11	8.06	7.50	8.47	3
8/13/2020 17:25	10.76	0.10	6.12	6.20	6.74	6.79	6.36	6.82	8.07	6.51	7.79	3
8/13/2020 17:38	6.92	2.57	3.69	3.64	0.11	3.39	4.39	2.47	5.62	3.51	4.09	4
8/13/2020 17:48	5.29	3.46	3.16	3.15	3.43	3.77	3.64	3.82	4.97	4.14	4.44	4
8/13/2020 17:58	5.59	3.69	3.32	3.45	4.17	4.29	3.86	4.83	5.61	5.27	5.35	4
8/13/2020 18:08	5.88	3.97	3.51	3.60	3.78	4.01	4.02	4.09	5.29	4.32	4.73	4
8/13/2020 18:18	6.31	4.25	4.04	4.04	4.59	4.18	0.12	4.15	6.02	4.39	5.41	4
8/13/2020 18:28	6.16	4.14	3.82	3.93	4.33	4.19	3.74	4.39	1.19	4.94	5.21	4
8/13/2020 18:38	5.23	4.01	3.56	3.56	3.79	3.75	3.46	3.53	4.77	3.51	4.52	4
8/13/2020 18:48	8.01	3.01	4.06	0.87	4.23	4.80	4.77	4.55	6.68	6.05	5.86	4
8/13/2020 18:58	8.28	4.88	4.63	4.46	5.60	0.10	4.93	5.23	6.67	5.05	6.20	4
8/13/2020 19:08	8.10	4.94	4.56	4.57	4.71	4.81	4.61	0.10	6.58	5.53	6.06	4
8/13/2020 19:18	8.01	4.66	4.55	4.64	5.02	5.09	4.77	5.21	6.34	0.26	6.54	4
8/13/2020 19:28	7.92	0.10	4.68	4.67	4.92	5.08	4.73	4.85	6.60	5.37	5.98	4
8/13/2020 19:38	7.52	4.41	4.11	4.52	4.89	4.92	4.57	5.07	6.33	5.36	5.76	4

APPENDIX F
VISIBLE EMISSIONS DATA

AK STEEL DEARBORN WORKS - VISIBLE EMISSIONS EVALUATION FORM

DATE: <u>8/13</u>
OBSERVER: <u>DP</u>
START: <u>711</u> am pm
FINISH: <u>811</u> am pm
Source: <u>C-BF Baghouse</u>
Observation Point <u>PCI Parking Lot</u>
distance from: <u>~650ft</u>
direction from: <u>SE</u>
source height: <u>~200'</u>
wind direction <u>N/A</u>
wind speed <u>0</u>
sky condition <u>clear</u>
amb. temp. (F) <u>64</u>
color of emissions <u>None</u>
Highest 3-min Average <u>N/A</u>
Highest 6-min Average <u>0%</u>
Remarks; <u>Concurrent with Stack Testing</u> <u>R-1</u>
Observer's Signature <u>Dan J. Pate</u>

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

Last Certification Date 6/24/20

AK STEEL DEARBORN WORKS - VISIBLE EMISSIONS EVALUATION FORM

DATE: 8-13-20

OBSERVER: J. Earl

START: 10:55 am pm

FINISH: 11:54 am pm

Source:
BF Casthouse
BA Stack

Observation Point
Contractor
Parking lot

distance from: 500'

direction from: SE

source height:
200'

wind direction NW

wind speed 5 mph

sky condition M. Sunny


amb. temp. (F) 81

color of emissions
None

Highest 3-min Average
N/A

Highest 6-min Average
0%

Remarks;

Observer's Signature


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

Last Certification Date 6-24-20

AK STEEL DEARBORN WORKS - VISIBLE EMISSIONS EVALUATION FORM

DATE: 8-13-20

OBSERVER: J. Earl

START: am 3:28 (pm)

FINISH: am 4:27 (pm)

Source: BF Casthouse
BH Stack

Observation Point: West boat slip road
near 90 day pad

distance from: 1000

direction from: W

source height: 200'

wind direction: ESE

wind speed: 10

sky condition: pt cloudy

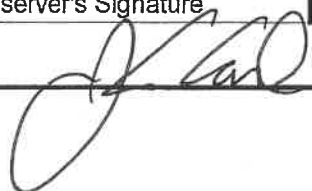
amb. temp. (F): 86

color of emissions: None

Highest 3-min Average: N/A

Highest 6-min Average: 0%

Remarks:

Observer's Signature: 

MIN	0	15	30	45	REMARKS	MIN	0	15	30	45	REMARKS
0	0	0	0	0		30					
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	0	0	0	0		51					
22	0	0	0	0		52					
23	0	0	0	0		53					
24	0	0	0	0		54					
25	0	0	0	0		55					
26	0	0	0	0		56					
27	0	0	0	0		57					
28						58					
29						59					

Last Certification Date 6-24-20

AK STEEL DEARBORN WORKS - VISIBLE EMISSIONS EVALUATION FORM

DATE: <u>8/13/20</u>
OBSERVER: <u>DP</u>
START: am <u>547</u> pm
FINISH: am <u>647</u> pm
Source: <u>C-BF Baghouse Stack</u>
Observation Point <u>In front of Warehouse - West side Boat Slip</u>
distance from: <u>~1400ft</u>
direction from: <u>SW</u>
source height: <u>~200ft</u>
wind direction <u>ESE</u>
wind speed <u>5-10</u>
sky condition <u>Clear</u>
amb. temp. (F) <u>84</u>
color of emissions <u>None</u>
Highest 3-min Average <u>N/A</u>
Highest 6-min Average <u>0</u>
Remarks; <u>Concurrent w/ R-4</u>
Observer's Signature <u>Dail P. Pote</u>

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

Last Certification Date 6/24/20



AeroMet
Engineering, Inc.
Solutions for a Changing Environment

Certification of Visible Opacity Reading

Jim Earl

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: June 24, 2020

Expiration Date: December 24, 2020

AeroMet Instructor: Jim Breese

AEROMET ENGINEERING INC. CERTIFIES THAT

Jim Earl

has qualified as a CERTIFIED VISIBLE
EMISSIONS READER
per Title 40 Part 60 Appendix A USEPA Method 9

Issued: 06/24/2020

Expires: 12/24/2020

Questions? Call 573.636.6393



AeroMet
Engineering, Inc.
Solutions for a Changing Environment

Certification of Visible Opacity Reading

David Pate

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: June 24, 2020

Expiration Date: December 24, 2020

AeroMet Instructor: Jim Breese

AEROMET ENGINEERING INC. CERTIFIES THAT

David Pate

has qualified as a **CERTIFIED VISIBLE
EMISSIONS READER**
per Title 40 Part 60 Appendix A USEPA Method 9

Issued: 06/24/2020 Expires: 12/24/2020

Questions? Call 573.636.6393

APPENDIX G

TEST PROTOCOL, REGULATORY LETTER, AND CORRESPONDENCE

AK Steel Corporation

4001 Miller Road
Dearborn, MI 48121-1699

TELEPHONE (313) 845-3217

James E. Earl

Environmental Affairs Manager
Dearborn Works

February 7, 2020

Ms. Karen Kajiya-Mills
Supervisor Technical Programs Unit
Michigan Department of Environment, Great Lakes, and Energy (EGLE)
Air Quality Division
P.O. Box 30260
Lansing, MI 48909

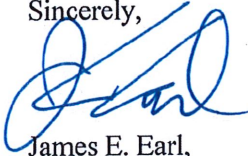
Subject: AK-Steel Dearborn Works, SRN A8640 – Test Protocols for C-Blast Furnace
(EUCFURNACE) Baghouse and Stoves for MI-ROP-A8640-2016a required
testing

Dear Ms. Kajiya-Mills,

Enclosed are hard copies of the referenced test protocols for the EUCFURNACE Baghouse and Stoves. The testing is being conducted to satisfy certain conditions in Michigan ROP MI-ROP-A8640-2016a, specifically conditions EUCFURNACE V.7 and EUCFURNACE V.8. The testing is scheduled to take place from March 24 – 27, 2020. The testing will be performed by Environmental Quality Management, Inc. (EQM) out of Cincinnati, Ohio.

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

Sincerely,



James E. Earl,
Environmental Affairs Manager, Dearborn Works

Enclosures

Cc: K. Koster - EGLE



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

**RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION**

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

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

Source Name AK Steel Dearborn Works County Wayne
Source Address 4001 Miller Road City Dearborn
AQD Source ID (SRN) A8640 ROP No. MI-ROP-A8640-2016a ROP Section No. 1

Please check the appropriate box(es):

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

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

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

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

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

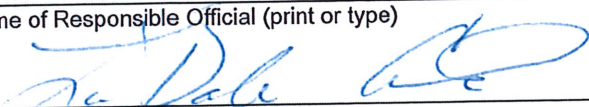
- 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.
- 2. During the entire reporting period, all monitoring and associated recordkeeping requirements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

Other Report Certification

Reporting period (provide inclusive dates): From N/A To N/A
Additional monitoring reports or other applicable documents required by the ROP are attached as described:

C-Blast Furnace Baghouse Emissions Test Plan and Notification

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

<u>LaDale Combs</u>	<u>General Manager</u>	<u>(313) 317-8955</u>
Name of Responsible Official (print or type)	Title	Phone Number
		<u>2/5/20</u>
Signature of Responsible Official		Date

* Photocopy this form as needed.

**SOURCE TESTING PROTOCOL
COMPLIANCE TESTING
C-BLAST FURNACE BAGHOUSE
AK STEEL DEARBORN WORKS
DEARBORN, MICHIGAN**

Prepared for:



Michigan Department of Environment, Great Lakes, and Energy (EGLE)
Air Quality Division
Compliance Support Unit
Constitution Hall
525 W. Allegan Street – 3rd Floor North
Lansing, Michigan 48909

Prepared by:



Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, Ohio 45240-2788
(800) 229-7495
www.eqm.com

EQM PN: 050074.0221

January 2020

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1. INTRODUCTION

Environmental Quality Management, Inc. (EQM) has been retained by AK Steel Dearborn Works to plan and conduct a compliance air sampling program at the C-Blast Furnace Baghouse exhaust. The compliance program will be conducted to evaluate emissions of particulate matter (PM), particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), lead (Pb), manganese (Mn), carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOC), and visible emissions (VEs). Three sampling runs, each run a minimum of 1 cast and 1 hour in duration, will be conducted for each method except for visible emissions. Each run will consist of an integral number of casts. A 1-hour run will be conducted for visible emissions concurrently with each PM/CPM sampling run. EPA-approved sampling methods and laboratory analysis procedures will be used to meet the objectives of the sampling program.

An outline of the test program is presented in Table 1-1. Project participants and responsibilities are presented in Table 1-2. Permit limits are presented in Table 1-3. The following sections describe the sampling locations, process, sampling and analytical methods, project schedule, and final report format.

This test protocol is submitted to establish the test dates of March 25-27, 2020.

Table 1-1. Sampling Requirements

Test Point No.	Test Point Name	Parameter Tested	Test Method
1	C-Blast Furnace Baghouse Exhaust	Flow Moisture PM/Condensables O ₂ , CO ₂ , NO _x , CO, VOC Pb, Mn Opacity	EPA Method 2 EPA Method 4 EPA Method 5/202 EPA Method 3A, 7E, 10, 25A EPA Method 29 EPA Method 9

Note: PM_{2.5} and PM₁₀ will be reported as the sum of the particulate and condensable fractions.

Table 1-2. Project Participants

Name/Company	Responsibility
Jim Earl/AK Steel David Pate/AK Steel	Coordinate Process Operation and Sampling Activities Site/Process Preparation Process Information
Dan Scheffel/EQM	Senior Review Technical Advisor
Douglas Allen/EQM	EQM Project Manager Direct Field Sampling Efforts Test Protocol/Report
Ben Fern/EQM Chris Janzen/EQM Gary Drexler/EQM Eric Zang/EQM Nick Pharo/EQM	Field Sampling Crew Field Sampling Crew Field Sampling Crew Field Sampling Crew Field Sampling Crew
Robert Bingham/Smoke Reader LLC	VE Observations

Table 1-3. Emission Limits for C-Blast Furnace Baghouse Stack

Parameter	Emission Limit
Particulate Matter (PM)	0.003 gr/dscf
	13.87 lb/hr
Particulate Matter < 10 Microns (PM ₁₀)	18.24 lb/hr
Particulate Matter < 2.5 Microns (PM _{2.5})	18.24 lb/hr
Oxides of Nitrogen (NO _x)	5.46 lb/hr
Carbon Monoxide (CO)	56.25 lb/hr
Non-Methane Volatile Organic Compounds (VOC)	9.92 lb/hr
Lead (Pb)	0.0077 lb/hr
Manganese (Mn)	0.042 lb/hr
Visible Emissions (VE)	10%, 6-minute average

2. TECHNICAL APPROACH

Environmental Quality Management, Inc. (EQM) has been retained by AK Steel Dearborn Works to plan and conduct a compliance air sampling program at the C-Blast Furnace Baghouse exhaust. The compliance program will be conducted to evaluate emissions of particulate matter (PM), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), lead (Pb), manganese (Mn), carbon monoxide (CO), oxides of nitrogen (NO_x), volatile organic compounds (VOC), and visible emissions (VEs). EPA-approved sampling methods and laboratory analysis procedures will be used to meet the objectives of the sampling program. The compliance sampling will be performed simultaneously using the following methods: 5/202, 29, 3A, 7E, 10, and 25A; continuous analyzers will be used to determine O_2 , CO_2 , NO_x , CO, and VOC emissions. PM_{10} and $PM_{2.5}$ will be calculated as the sum of filterable and condensable particulate fractions. Each sampling run except for visible emissions will be a minimum of one cast and one hour in duration and will consist of an integral number of casts. For visible emissions, EPA Method 9 will be conducted for 1 hour during each Method 5/202 sampling run. Process data will be collected by AK Steel over the duration of each sampling run. EQM estimates it will take 1 to 2 sampling days to complete the project.

3. SAMPLING AND ANALYTICAL PROCEDURES

The sampling and analytical procedures to be used in this test program conform to EPA Reference Methods 1 through 4; Method 5/202 for PM, PM₁₀, and PM_{2.5}; Method 9 for opacity; Method 29 for Pb and Mn; and CEM Methods 3A, 7E, 10, and 25A for O₂/CO₂, NO_x, CO, and VOC, as published in 40 CFR Part 60, Appendix A and 40 CFR Part 51, Appendix M.

3.1 Location of Measurement Sites

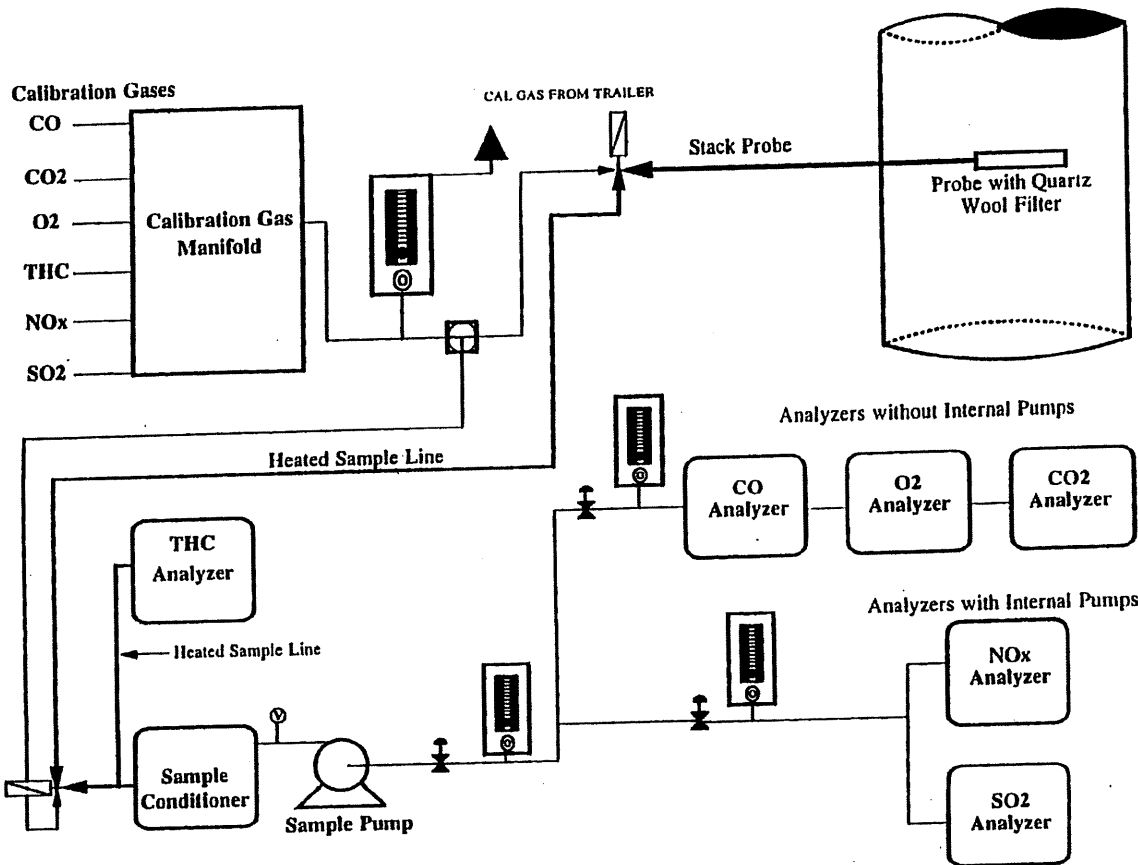
EPA Method 1, "Sample Velocity Traverses for Stationary Sources," will be used to select representative measurement sites. The sampling location is shown in Section 4. Exact measurements will be confirmed on site.

3.2 Stack Gas Volumetric Flow Rate

EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate," will be used to determine volumetric flow rate. A Type "S" pitot tube with an assigned coefficient of 0.84 and an inclined manometer will be used to measure velocity pressure. A calibrated Type "K" thermocouple attached directly to the pitot tube will be used to measure stack gas temperature. The average stack gas velocity is calculated from the average velocity pressure, average stack gas temperature, stack gas molecular weight, and absolute static pressure. The volumetric flow rate is the product of velocity and the stack cross-sectional area. One velocity traverse will be conducted per compliance run.

3.3 Stack Gas Dry Molecular Weight

EPA Reference Method 3A, "Gas Analysis for the Determination of Dry Molecular Weight by Instrumental Analyzer," will be used for the compliance testing on the C-Blast Furnace Baghouse to determine CO₂ and O₂ concentrations. The instrument used will be a paramagnetic analyzer manufactured by Servomex. Figure 3-1 is a schematic of the sampling system.



Note: This study will use the CO, NO_x, CO₂, O₂ and THC analyzers.

Figure 3-1. CEM Sample Flow and Calibration System

3.4 Moisture

EPA Method 4, "Determination of Moisture Content in Stack Gases," will be used to determine moisture content. Moisture will be determined by weighing the impingers in the back half of the Method 5/202 and the Method 29 sampling trains.

3.5 Filterable Particulate and Condensable

EPA Method 5/202 will be used to measure the concentration and mass emission rate of total filterable particulate matter from the C-Blast Furnace Baghouse Stack. Particulate matter of less than 10 microns (PM₁₀) and particulate matter of less than 2.5 microns (PM_{2.5}) will be

determined as the sum of the filterable and condensable fractions. Figures 3-2 and 3-3 present schematics of the sampling trains for Method 5 and Method 202, respectively.

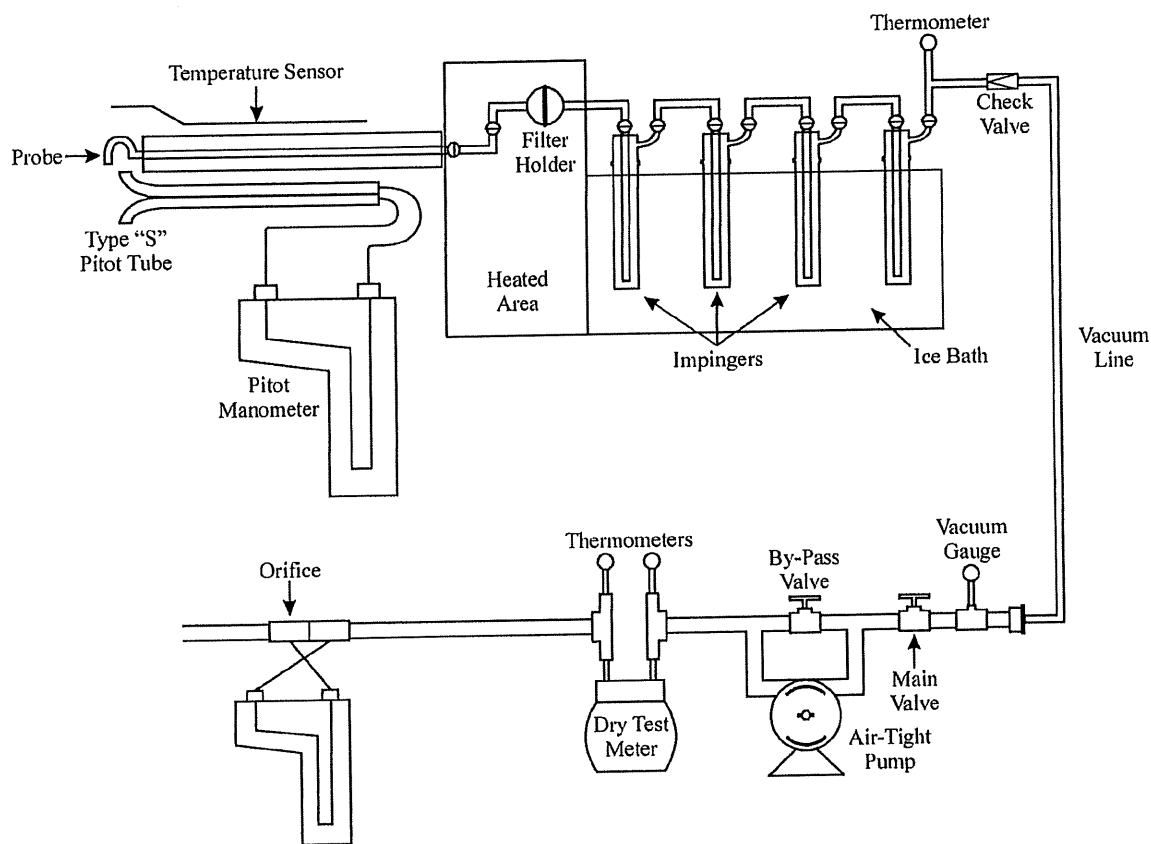


Figure 3-2. Method 5 Front-half of Sampling Train

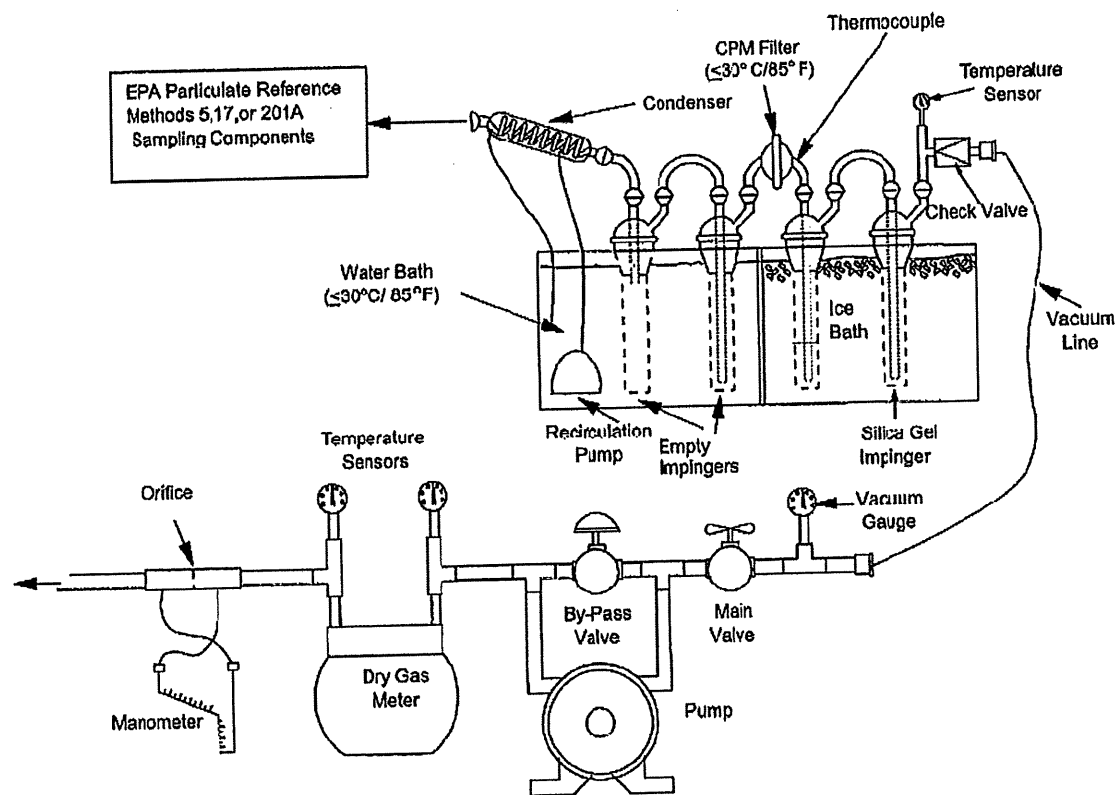
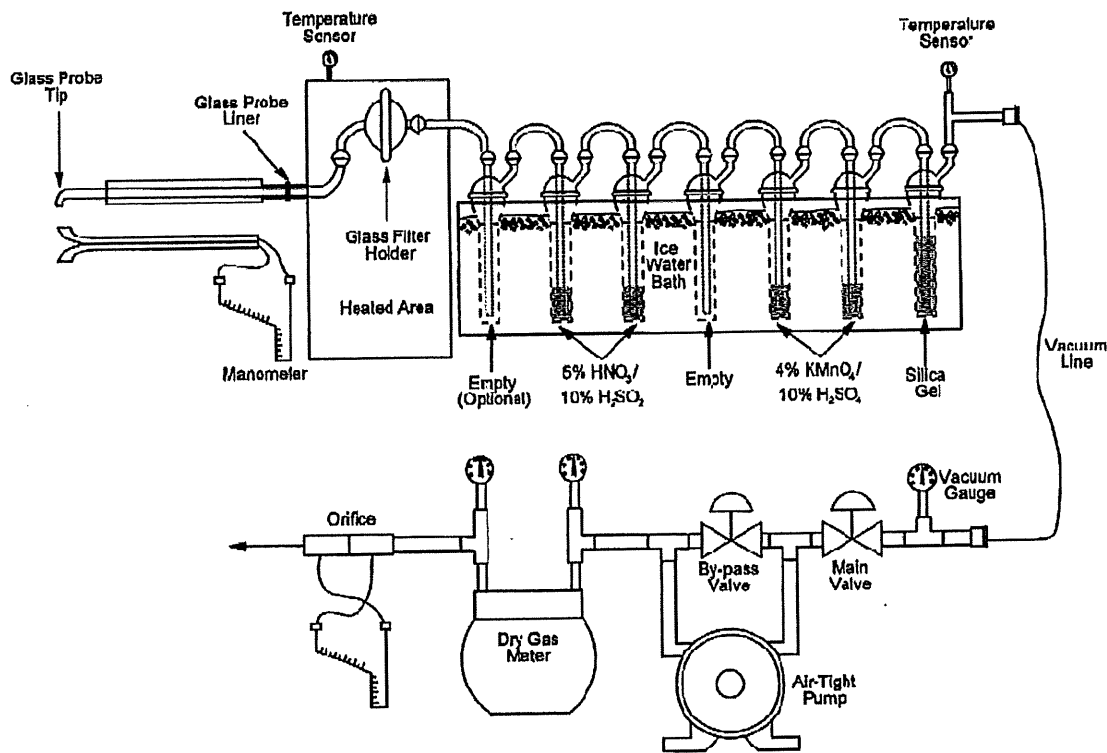


Figure 3-3. Method 202 Sampling Train

3.6 Metals

EPA Method 29 will be used to determine Pb and Mn emissions from the C-Blast Furnace baghouse stack. The test apparatus consists of a glass nozzle, a heated glass-lined probe, a heated 83-mm quartz fiber filter, four to five chilled impingers, and a metering console. The samples will be withdrawn isokinetically from the source. Particulate emissions are collected in the probe and on the heated filter, and the gaseous emissions are then collected in an aqueous acidic solution of hydrogen peroxide in order to measure lead and manganese. The recovered samples are digested and analyzed at the laboratory. Figure 3-4 is a schematic of the Method 29 sampling train.



Note: The first empty impinger and the 4% $\text{KMnO}_4/10\% \text{H}_2\text{SO}_4$ will not be used.

Figure 3-4. Method 29 Sampling Train

3.7 Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds

EPA Methods 7E, 10, and 25A will be used to measure NO_x , CO, and VOC emissions from the C-Blast Furnace Baghouse Stack. Stack gas will be sampled from the stack using a heated stainless steel probe and a heated sampling line. The NO_x and CO samples will be routed through a sample conditioner to remove moisture and the gas will be analyzed for NO_x and CO on a dry basis. EPA protocol gasses will be used for calibration and bias checks on the instruments in accordance with EPA Methods 7E and 10. VOC samples will be taken on a wet basis through a heated flame ionization analyzer (FIA). The analyzer will consist of two Flame Ionization Detectors (FID's). Once inside the analyzer, one portion of the gas stream will be routed to one FID that measures total VOC. Another portion will pass through a propriety-design non-methane hydrocarbon cutter that oxidizes all hydrocarbons except for methane. The resultant methane containing stream will then be routed to another FID where methane concentration will

be measured. Methane concentration will be deducted from the total VOC concentration to obtain the Non-Methane Hydrocarbon emissions. The final reported VOC emissions will be as Non-Methane hydrocarbons. The FIA will be calibrated using 3 methane standards in air and a zero gas. Calibrations and drift checks will be conducted in accordance with EPA Method 25A.

3.8 Opacity

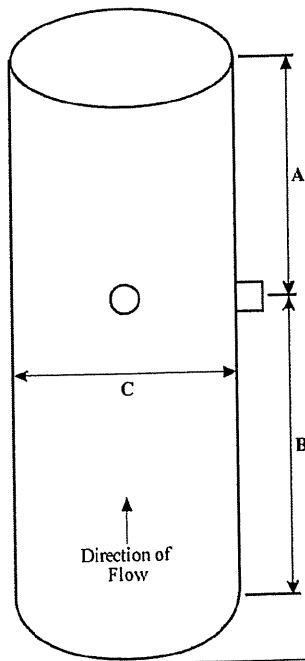
EPA Method 9, "Visual Determination of the Opacity of Emissions from Stationary Sources," will be used to measure visible emissions from the C-Blast Furnace Baghouse stack. During each particulate measurement run, plume opacity will be recorded every 15 seconds or four readings per minute, for 60 minutes. Other parameters recorded during each test run will be the observer's position relative to the plume, viewing background, weather conditions and wind direction, and ambient air humidity and temperature.

4. PROCESS DESCRIPTION/SAMPLING LOCATIONS

Molten iron (hot metal) is produced in the blast furnaces by heating iron ore pellets and other iron-bearing materials, coke, limestone, slag, or other fluxing material. Burden materials consisting of iron ore pellets, flux material (slag, limestone or dolomite), and a carbon source (usually coke) are delivered to and charged into the top of the furnace. Additional carbon is supplied to the furnace by injecting natural gas and pulverized coal into the hot blast section of the furnace. Preheated combustion (hot blast) air is pushed vertically through the burden material in the furnace from tuyeres located at the bottom of the furnace. The components of the burden chemically react with the hot blast air to reduce the iron oxides into elemental iron and melt. The blast furnace produces molten iron, blast furnace gas, and slag.

Periodically, the molten iron and slag are cast from the furnace into a trough and iron runners in the floor of the casthouse. The slag is separated from the molten iron in the trough prior to entering refractory lined bottle cars. The slag is then diverted to slag pots. The molten iron is transported in bottle cars to the BOF for use in the steelmaking process.

Emissions generated within the casthouse from the molten iron and slag that are cast from the C Blast Furnace are captured by collection hoods and routed to a baghouse that is used to control particulate emissions from the process. Figure 4-1 present the sampling location.



Location	Upstream A	Downstream B	Inside Diameter C
C Blast Furnace Baghouse	>37 ft	>148 ft	152"
4 Sample Ports	Three Traverse Points per Port		12 Total Sample Points
Traverse Pt 1 - 20.69"	Travers Pt 2 - 36.19"		Traverse Pt 3 - 58.99"

Figure 4-1. Sampling Location - C Blast Furnace Baghouse

5. PROCESS DATA

AK Steel personnel will include the following process data in the final report:

- Start and stop time and amount of iron of each cast
- Overall baghouse differential pressure and bag leak detection data
- Inlet pressure and casthouse damper positions.

6. TEST COMMENTS

At the end of the sample run, we may not be finished with the complete heat cycle. If we have additional time to complete the heat, we will start again in the first port and continue testing until the heat is completed.

VOC emissions will be reported as Non-Methane VOC. A non-methane hydrocarbon cutter will be used to determine methane emissions to deduct from the total VOC. Refer to section 3.7 for details.

7. QUALITY ASSURANCE AND QUALITY CONTROL

The field sampling quality assurance for this project includes the use of calibrated source sampling equipment, reference test methods, and traceability protocols for recording and calculating data. The analytical quality assurance includes use of validated analytical procedures, calibration of analytical instruments, and analysis of control samples and blanks. The calibration and quality control procedures to be used for this test program are described in the following subsection.

7.1 Calibration Procedures and Frequency

All manual stack gas sampling equipment is calibrated prior to the test program in accordance with the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III*, EPA-600/4-72-027B. Table 7-1 summarizes the stack gas sampling equipment calibrations performed in preparation for this project. The meter boxes are re-calibrated after the test.

Table 7-1. Field Equipment Calibrations^a

Equipment	Calibrated Against	Allowable Error
Method 5 meter box	Reference test meter	Y ±0.02 Y ΔH@ ±0.20 ΔH@ post-test Y ±0.05 Y
Orsat	Certified cylinder gas	±0.5%
Pitot tube	Geometric specifications	See EPA Method 2
Thermocouple	ASTM-3F thermometer	±1.5%
Impinger (or condenser thermometer)	ASTM-3F	±2°F
Dry gas meter thermometer	ASTM-3F	±5°F
Probe nozzles	Caliper	High-low 0.004 in.
Barometer	NBS traceable barometer	±0.1 in. Hg

^aAs recommended in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary Source-Specific Methods*. EPA-600/4-77-027b, August 1977.

Table 7-2 lists additional calibration checks performed on the sampling equipment on site, just prior to the testing, to ensure that equipment was not damaged during transport. The analyzer is checked initially and then throughout the sampling system. The analyzer is calibrated

before and after each test run. Protocol One calibration gases are used to calibrate the O₂, CO₂, NO_x, CO, and VOC analyzer.

Table 7-2. Field Checks of O₂, CO₂, CO, NO_x, and VOC Analyzers

Calibration	Instrument Check	Acceptable Limit
Initial Calibration	O ₂ , CO, SO ₂ , CO ₂ , and NO _x Calibration Error, % Span	±2%
	VOC Calibration Error, % Calibration Gas Value	±5%
	Sampling System Bias	±5% of Span
Daily Calibration	O ₂ , CO, SO ₂ , CO ₂ , and NO _x Calibration Error, % Span	±2%
	VOC Calibration Error, % Calibration Gas Value	±5%
	O ₂ , CO, SO ₂ , CO ₂ , and NO _x , and VOC Drift, % Span	±3% of Span

8. PROJECT SCHEDULE

The following schedule outlines the daily activities for this project. The order of sampling events may change based on production schedules or weather. Both the C-Blast Furnace Stove stack and the C-Blast Furnace Baghouse stack will be tested from March 24-27 2020. It is anticipated that the stoves will be tested on March 24.

- Days 1-3, March 25-27, 2020
 - C-Blast Furnace Baghouse Exhaust
 - Three test runs: 5/202, 5/29, 3A, 7E, 9, 10, and 25A (each test is nominally 1-3 hours of sampling time; VE runs will be 1 hour during each 5/202 test run)
- Day 5, Samples delivered to lab
- Day 25, Preliminary Results
- Days 45-55, Final Test Report to AK
- Days 55-60, Final Test Report to EGLE

9. FINAL REPORT FORMAT

Contents

Section

- 1 Introduction
- 2 Summary of Test Results
- 3 Sampling and Analytical Procedures
 - 3.1 Location of Measurement Sites
 - 3.2 Stack Volumetric Flow Rate
 - 3.3 Stack Gas Dry Molecular Weight
 - 3.4 Moisture
 - 3.5 Filterable Particulate and Condensables
 - 3.6 Filterable Particulate and Metals
 - 3.7 Nitrogen Oxides, Carbon Monoxide, Volatile Organic Compounds
 - 3.8 Visible Emissions
4. Process Description/Sampling Location
5. Quality Assurance/Quality Control

Appendix A Calculations

Appendix B Raw Field Data

Appendix C Process Data

Appendix D Quality Assurance/Quality Control

Appendix E Test Protocol and EGLE Notification



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
WARREN DISTRICT OFFICE



LIESL EICHLER CLARK
DIRECTOR

March 11, 2020

Mr. Jim Earl
Environmental Manager
AK Steel Dearborn Works
4001 Miller Road
Dearborn, Michigan 48120

SRN: A8640

Dear Mr. Earl:

SUBJECT: C-Blast Furnace Baghouse and Stove Stack exhaust emission test at AK Steel
Dearborn Works
MI-ROP-A8640-2016a

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD) has completed the quality assurance review of the test protocol for filterable particulate matter (PM), PM with a nominal aerodynamic diameter of 2.5 micron or less (PM_{2.5}), PM with a nominal aerodynamic diameter of 10 micron or less (PM₁₀), carbon monoxide (CO), nitrogen oxides (NO_x), lead (Pb), manganese (Mn), and volatile organic compound (VOC) emission testing on the C-Blast Furnace Baghouse at the AK Steel Dearborn Works Facility (AK) received on February 7, 2020. Visible emissions will be evaluated concurrently with each PM run. The C-Blast Furnace Stove will be tested for PM, PM_{2.5}, PM₁₀, CO, NO_x, Pb, Mn, and mercury (Hg). MI-ROP-A8640-2016a require this test. All sampling will be performed according to the United States Environmental Protection Agency (USEPA) methods found at epa.gov/emc. Any modification to a method or testing location must be approved by the AQD. Testing is scheduled to begin March 24, 2020.

Process

Emissions from the C-Blast Furnace will be sampled under maximum routine operating conditions and while the baghouse operates normally. During each test run on the baghouse the following information will be recorded:

- Start and stop time of each cast and each test run
- Tons of iron and tons of slag tapped per cast and per hour
- Baghouse pressure drop
- Bag leak detector readings
- Casthouse damper positions and inlet pressure
- EPA Method 9 VE readings

During each test run on the stove stack the following information will be recorded:

- Start and stop time of each cast and each test run
- Start and stop time of the operational cycle for each stove
- Amount of blast furnace and natural gas fired per test run

After the test has begun it shall continue and be completed within a 36-hour period. AK shall not interrupt testing without the prior consent of the AQD unless there is a forced shutdown or circumstances occur that are beyond the operator's control, such as extreme meteorological conditions. During the test AQD district staff will coordinate the operation of the process and the collection of process data. If you have questions about process, please contact Ms. Katie Koster at 313-456-4678 or Kosterk1@michigan.gov.

Test

Mr. Jim Earl
AK Steel Dearborn Works
Page 2
March 11, 2020

PM, PM_{2.5}, PM₁₀, NO_x, CO, VOC, Pb, Mn, and Hg will be tested according to USEPA reference methods 1, 2, 3A, 4, 5, 7E, 10, 25A, 29, and 202 and will consist of 3 runs. Sampling on the baghouse will be a minimum of 1 cast and 1 hour and consist of an integral number of casts. Testing on the stove stack will be approximately 2 hours per run. PM₁₀ and PM_{2.5} will be assumed the equivalent of the PM and CPM. For method 202, MAQS has the option of baking the glassware at 300°C for six hours prior to beginning the test or recovering a field train proof blank before beginning the test. The recovery and analysis of at least one method 202 field train recovery blank is required. VE readings will be performed by a certified observer from the baghouse stack during each PM run in accordance with USEPA reference test method 9.

The analyzers will be calibrated with protocol 1 gases. The concentration of the calibration gases will meet the requirements of the methods. The calibration error, response time, system bias, and analyzer drift will be determined and reported. If a dilution system is used to generate calibration gases, then the report will contain the record of the annual calibration and the field evaluation of the equipment. If you have any questions regarding the test procedures, please contact me at 586-753-3745 or dziadoszm@michigan.gov.

Report

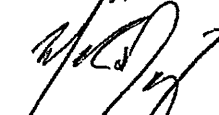
The test report will follow the AQD's "Format for Submittal of Source Emission Test Plans and Reports." The AQD requests that the results are presented in tables. Emissions will be reported in units of the permit limits. The report will include the lot analysis for solvents used in blank corrections (if applicable), the test results, all laboratory data, the operational data, the calibration record, the audit sample results, any aborted or failed runs, and quality assurance checks of the equipment used for this test and all field notes for this project. In addition, the report will include the VE readings made by the certified observer, and a record of any maintenance performed on the baghouse. Please submit a complete copy of the final test report to both:

Ms. April Wendling
Michigan Department of Environment,
Great Lakes, and Energy
District Supervisor, Air Quality Division
Cadillac Place
3058 West Grand Blvd, Suite 2-300
Detroit, Michigan 48202-6058

Ms. Karen Kajiya-Mills
Michigan Department of Environment,
Great Lakes, and Energy
Air Quality Division
Constitution Hall, 2nd Floor South
525 West Allegan Street
Lansing, Michigan 48933-1502

Please notify both Ms. Koster and me if there is a change in schedule.

Sincerely,



Mark Dziadosz
Air Quality Division

cc: Mr. Doug Allen, EQM
Mr. David Pate, AK
Ms. Karen Kajiya-Mills, EGLE
Ms. April Wendling, EGLE
Ms. Katie Koster, EGLE



[EXT] RE: AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

Koster, Katherine (EGLE) to: david.pate@aksteel.com,
Kajiya-Mills, Karen (EGLE)

05/04/2020 01:38 PM

Received. Thanks for the update.

From: david.pate@aksteel.com <david.pate@aksteel.com>

Sent: Monday, May 4, 2020 11:51 AM

To: Koster, Katherine (EGLE) <KOSTERK1@michigan.gov>; Kajiya-Mills, Karen (EGLE) <KAJIYA-MILLSK@michigan.gov>

Subject: AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

Hi Katie and Karen,

The scheduled stack testing at the blast furnace for the week of May 11-15 has been postponed. Primary operations have been idled since March 31 and it is anticipated that they will remain idled at least through May. No specific date has been set for startup.

I have reached out to the stack testing company concerning alternative testing dates in June. I will let you know when we have something scheduled.

Please call me if you have any questions or concerns.

Thanks,

David Pate
Environmental Engineer
AK Steel Dearborn Works
C: 248-251-3440

Confidentiality Notice

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Re: AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

David Pate to: Katherine (DEQ) Koster
Cc: kajija-millsk

05/15/2020 08:29 AM

Hi Katie and Karen,

We have rescheduled the following stack test dates for the C-Blast Furnace Baghouse and Stoves:

RATA Only on Baghouse and Stoves - June 16-17

Compliance Testing on Baghouse and Stoves - Week of July 13-17 - The stack testing company did not have the people available to do the RATA and the compliance testing simultaneously. July 13-17 was the first week where they had sufficient people to perform the compliance testing.

At the moment, I have no idea when we will be starting up again. I will certainly keep you posted on that.

Thanks,

David Pate
Environmental Engineer
AK Steel Dearborn Works
O: 313-323-1261
C: 248-251-3440

David Pate

Hi Katie and Karen, The scheduled stack testing...

05/04/2020 11:51:27 AM

From: David Pate/AKSTEEL
To: "Katherine (DEQ) Koster" <KOSTERK1@michigan.gov>, kajija-millsk@michigan.gov
Date: 05/04/2020 11:51 AM
Subject: AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

Hi Katie and Karen,

The scheduled stack testing at the blast furnace for the week of May 11-15 has been postponed. Primary operations have been idled since March 31 and it is anticipated that they will remain idled at least through May. No specific date has been set for startup.

I have reached out to the stack testing company concerning alternative testing dates in June. I will let you know when we have something scheduled.

Please call me if you have any questions or concerns.

Thanks,

David Pate
Environmental Engineer
AK Steel Dearborn Works
C: 248-251-3440



AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

David Pate to: Katherine (DEQ) Koster
Cc: kajija-millsk, Jim Earl

06/09/2020 12:18 PM

Hi Katie and Karen,

The scheduled RATA on the C-Blast Furnace Baghouse and Stoves will not be taking place on June 16-17 as we remain idled. We are now currently planning to perform this testing the same week as the Compliance Testing on the Baghouse and Stoves (Week of July 13-17).

Thanks,

David Pate
Environmental Engineer
AK Steel Dearborn Works
O: 313-323-1261
C: 248-251-3440



RE: [EXT] FW: Enforcement Discretion Request - AK Steel Dearborn Works
(Facility A8640)

Koster, Katherine (EGLE) to: david.pate@aksteel.com
Cc: "jim.earl@aksteel.com", "Angellotti, Regina (EGLE)"

06/25/2020 09:32 PM

Dave,

Thank you for the update. Regarding RATA's, as you are aware, a RATA is required to be performed in the same quarter each year per Appendix F of Part 60. With the delay in facility startup, the RATA is going to be performed in a different, later quarter. AQD understands AK Steel is not operating and has not operated the blast furnace in the second quarter of 2020 and can't perform a RATA. It appears that the regulations allow for a delay in this instance per Appendix F, Part 60, "5.1.4 Other Alternative Audits. Other alternative audit procedures may be used as approved by the Administrator for three of four calendar quarters. One RATA is required at least every four calendar quarters, except in the case where the affected facility is off-line (does not operate) in the fourth calendar quarter since the quarter of the previous RATA. In that case, the RATA shall be performed in the quarter in which the unit recommences operation. Also, cylinder gas audits are not be required for calendar quarters in which the affected facility does not operate." However, please be aware that AQD expects the 2021 RATA's to be performed under the "original" schedule which is during the 2nd quarter.

Let me know if you have any questions.

Thanks

Katie Koster
Air Quality Division
Detroit District Office
Michigan Department of Environment, Great Lakes, and Energy
313-456-4678 | kosterk1@michigan.gov
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From: david.pate@aksteel.com <david.pate@aksteel.com>
Sent: Thursday, June 25, 2020 11:05 AM
To: Koster, Katherine (EGLE) <KOSTERK1@michigan.gov>
Cc: jim.earl@aksteel.com
Subject: Re: [EXT] FW: Enforcement Discretion Request - AK Steel Dearborn Works (Facility A8640)

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

Katie -

An update on the following 2 areas where we requested enforcement discretion:

1. AK Staff and contractors completed field certifications on 6/24.
2. At the moment, startup of the primary side at some point in late July (after July 20) is looking probable. We have re-scheduled the Blast Furnace Testing (including RATA - Both Baghouse and Stoves) for the week of 8/10.

Thanks,

David Pate
Environmental Engineer
AK Steel Dearborn Works
313-323-1261

From: "Koster, Katherine (EGLE)" <KOSTERK1@michigan.gov>
To: "Pate, David" <David.Pate@aksteel.com>, "Earl, Jim (Jim.Earl@aksteel.com)" <Jim.Earl@aksteel.com>, "Long, Michael E" <Michael.Long@clevelandcliffs.com>
Cc: "EGLE-EnforcementDiscretion" <EGLE-EnforcementDiscretion@michigan.gov>, "Doleharty, Mary Ann (EGLE)" <DOLEHANTYM@michigan.gov>, "Ethridge, Christopher (EGLE)" <ETHRIDGEC@michigan.gov>, "Garcia, Karen (EGLE)" <GARCIAK1@michigan.gov>, "Kajiya-Mills, Karen (EGLE)" <KAJIYA-MILLSK@michigan.gov>, "Wendling, April (EGLE)" <WendlingA@michigan.gov>, "Korniski, Jeffrey (EGLE)" <KORNISKIJ@michigan.gov>
Date: 05/15/2020 02:21 PM
Subject: [EXT] FW: Enforcement Discretion Request - AK Steel Dearborn Works (Facility A8640)

Mr. Pate,

EGLE/AQD has received your request for enforcement discretion for the stack testing of the EUCFURNACE baghouse stack and stove stack and for the performance of certified Method 9 readings at AK Steel Dearborn Works due to the COVID-19 emergency restrictions. According to your request, the stack test was required by March 29, 2020, for the baghouse stack and by April 25, 2020, for the stove stack per MI-ROP-A8640-2016a. As you noted, AQD previously granted these stack testing extension requests on March 23, 2020. Your current request offers additional information that the facility has been idled since March 30, 2020, and does not have a firm startup date. AK Steel plans to conduct testing as soon as "practical" after C Blast Furnace (EUCFURNACE) operations resume. On a separate note, due to the cancellation of field certification classes in April 2020, Method 9 certifications have lapsed for staff and contractors that conduct certified readings at AK Steel. AK Steel proposes to continue to conduct required Method 9 readings with previously certified readers throughout the uncertified period until the field certification class become available.

Per EGLE/AQD's temporary COVID-19 policy, EGLE/AQD will use enforcement discretion in regard to the stack testing deadlines for the EUCFURNACE baghouse stack and stove stack per the following conditions: 1) company provides advanced written notice including the specific reasons the deadlines cannot be met; 2) Title V sources shall include the missed stack tests in their deviation reporting; and 3) company confers with EGLE/AQD staff on the schedule for restarting the operations and a schedule for make-up testing, including efforts to identify other qualified testing companies if the preferred contractor is unable to perform the testing in a timely manner.

Additionally, recognizing Method 9 readers are currently unable to complete required 6-month re-certifications



AK Steel Dearborn Works - Stack Testing Update

06/30/2020 08:55 AM

David Pate to: kajiya-millsk
Cc: "'KOSTERK1@michigan.gov' (KOSTERK1@michigan.gov)", Jim Earl



AK Steel C-Blast Furnace Baghouse and Stoves.pdf



AL-A8640 AK Steel C-Blast Furnace Baghouse and Stove RATA.pdf



A8640-AK Steel BOF ESP and SEC Baghouse Retest.pdf A8640 - ESP Performance Testing.pdf

Hi Katie and Karen,

At the moment, it is likely that we will be starting up in the later part of July (on or after July 20), Testing has been rescheduled to the following dates:

- C-BF Baghouse and Stoves RATA - Week of 8/10 to 8/14 (commencing test on 8/11)
- C-BF Baghouse and Stoves Compliance Testing - Week of 8/10 to 8/14 (commencing test on 8/11) - performed during same mobilization as RATA
- ESP and SEC Baghouse Lead and Manganese - Week of 8/17 to 8/21 (commencing test on 8/14)
- ESP MACT Performance Test - Week of 8/17 to 8/21 (Commencing test on 8/14) - performed during same mobilization as RATA

I have attached the test protocol approval letters for reference.

Please let me know if you have any questions or concerns.



David Pate
Senior Environmental Engineer, Dearborn Works
p 313.323.1261 m 248.251.3440
david.pate@aksteel.com

David Pate | Hi Katie and Karen, The scheduled RATA on the... | 06/09/2020 12:18:51 PM

From: David Pate/AKSTEEL
To: "Katherine (DEQ) Koster" <KOSTERK1@michigan.gov>
Cc: kajiya-millsk@michigan.gov, Jim Earl/AKSTEEL@AKSTEEL
Date: 06/09/2020 12:18 PM
Subject: AK Steel Dearborn Works - Week of May 11 Stack Testing on Blast Furnace

Hi Katie and Karen,

The scheduled RATA on the C-Blast Furnace Baghouse and Stoves will not be taking place on June 16-17 as we remain idled. We are now currently planning to perform this testing the same week as the Compliance Testing on the Baghouse and Stoves (Week of July 13-17).



Baghouse Testing

David Pate to: Katherine (DEQ) Koster, dziadoszm

08/13/2020 09:19 AM

Mark and Katie,

We started the baghouse compliance testing this morning and had a couple of issues:

1. A bolt on one of the baghouse fan dampers broken which caused the damper to drift closed. As a result, the baghouse was essentially on one ID Fan for a large portion of the run. Under representative conditions, we run on 2 fans. During that time period, I believe that we stayed above our O&M thresholds but I have not conducted a detailed review of the data yet.

2. VOC concentration maxed out above the instrument range for a fair time period (I think 20-30 minutes); We investigated and found a natural gas valve open on the tuyere deck above the taphole. The gas valve was closed. I do not have any faith in the results of that run. Preliminary results were 18.6 Lb/hr (limit is 9.92).

We ran for the entire cast but it ended up being a short cast so we did not get all the points sampled. I made the decision to end the run instead of sampling another cast due to the issues and turn the trains around for the next cast.

Our plan is to report results for the first run (we will analyze for PM, CPM, Pb, Mn) but to flag the process and testing issues with it and conduct another 3 runs under representative conditions to serve as the basis for compliance.

Please don't hesitate to call if you have any questions for concerns.



David Pate

Senior Environmental Engineer, Dearborn Works

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APPENDIX F: OIL ASSESSMENT FROM QUAKER HOUGHTON



VOC content for coatings and oil

Quaker Houghton (QH) supplies 11 different oils to Cleveland Cliffs Middletown Works (MW) and sells 1 additional oil that is manufactured by a third party.

QH has been tasked with examining the potential for any of these oils to be replaced with other readily available and lower VOC products. The remainder of this letter summarizes QH's assessment of lower VOC alternatives for MW.

QH has identified 6 of the 11 oils that have been formulated specifically for the processes at MW and, consequently, do not have readily available alternatives. The majority of these 6 oils are products that already contain very low concentrations of VOC. The oils with formulations designed specifically for MW includes the following:

- Anti Galling Oil: MP-16,
- Rolling Oil: AKM-163, Rolling Oil Quaker TH Oil, Rolling Oil TM 98, Rolling Oil HB-15, and
- Rust Preventative Oil: Ferrocote EGL-1-EG.

QH has identified 2 of the 11 oils that, while not specifically formulated for MW, do not have readily available alternatives. One of these oils is Prelube Oil Ferrocote 61 MAC HCL 1, which has no available QH alternative, and which already has a very low VOC concentration. The other oil is Rust Preventative Oil Ferrocote 722, which has no available QH alternative.

QH has identified 1 of the 11 oils, Pre lube Oil Metalub PL7105A, which is a Fuchs product and is extremely low VOC. QH's assessment is that it is unlikely that there is a lower VOC alternative anywhere on the market and it is used in very low volumes at MW.

Finally, QH has identified 2 of the 11 oils used at MW that are blended on site at MW and used as rust preventative oils. While the blends are unique to MW, the components of the blends are common products. The as-applied VOC content for the two blended products is 0.98 lb VOC/gal and 1.69 lb VOC/gal for FC 61 and K6, respectively. QH considered whether there may be the potential to replace the higher VOC components of these blends with different components; however, investigation into replacing the carrier base oil components for each of these oils has not resulted in finding lower VOC alternatives. Additionally, QH considered the possibility of completely replacing the blend with a commonly available alternative with a lower overall VOC content.

Other rust preventative oils used on site could potentially be substituted and would represent a marginal decrease in VOC emissions if successful. QH's initial assessment yielded the following potential options:

- The K6 blend (1.69 lb VOC/gal) could hypothetically be replaced with Ferrocote 61 A US (0.44 lb VOC/gal).

Quaker Chemical Corporation
A Quaker Houghton Company

One Quaker Park
901 E. Hector Street
Conshohocken, PA 19428-2380
T: 610.832.4000
quakerhoughton.com



- The FC 61 blend (0.98 lb VOC/gal) could hypothetically be replaced with Ferroccote EGL-1-EG (0.47 lb VOC/gal)

Cleveland-Cliffs requested the cost for the current blended oils as well as the potential alternatives. The cost on a dollar per gallon basis is provided below:

- The current K6 blend is \$6.81/gal and the potential alternative, Ferroccote 61 A US, is \$10.95/gal.
- The current FC 61 blend is \$9.58/gal and the potential alternative, Ferroccote EGL-1-EG is \$12.14/gal.

Please note QH is not currently providing any indication that the alternatives provided above are technically viable for use at MW. At this point in time, there is no data to suggest that these alternatives, or any alternative, would or would not work in place of the blended products. The blended products were originally formulated to ensure Cleveland-Cliffs can safely and effectively make on-specification steel for its various customers. Determining whether an alternative is viable would require extensive testing and trials among QH, Cleveland-Cliffs, and its customers.

Quaker Houghton, as a supplier to Cleveland-Cliffs, has always, and will continue, to act in good faith in formulating products that meet or exceed customer specifications. In this regard, our company strives to limit the use of component chemicals that are hazardous to both human health and our environment, while simultaneously meeting our customer and industry needs. Our ability to react and formulate changes to products to improve performance and quality are critical to the industry we supply.

If you have any questions or require additional information, please do not hesitate to contact me at dan.hartman@quakerhoughton.com or c 937-903-0821.

Daniel Hartman

Sr. Program Manager

Quaker Houghton

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