EMISSIONS TEST REPORT

TUCSON IRON AND METAL

DIOXIN AND FURAN RETEST ON CONTRABAND INCINERATOR

Air Quality Permit: 127

Prepared for:

Tucson Iron and Metal
4484 East Tennessee Street
Tucson, AZ 85714

Prepared by:

Bison Engineering, Inc.
4251 S. Station Master Dr.
Tucson, AZ 85714
(520) 749-2167
www.bison-eng.com

Project Number: TIM220419
Test Dates: November 24, 2020
Report Issued: December 22, 2020

STAC
ACCREDITED
TO ASTM D7036 ONLY
CERT #4675.01

BISON ENGINEERING, INC.

EXECUTIVE SUMMARY

Tucson Iron and Metal contracted Bison Engineering, Inc. to perform an emissions re-test at their metal recycling facility in Tucson, Arizona. Testing was performed on the Contraband Incinerator exhaust stack to demonstrate compliance with Pima County Department of Environmental Quality Air Quality Permit 127 and Title 40 Code of Federal Regulations Part 60, Subpart EEEE. This report presents emissions test data, describes the methods employed and details the quality assurance measures taken to ensure accurate data. Table 1 summarizes the test results.

Table 1: Results Summary

Parameter	Units	Test Result	Permit Limit
Dioxins/Furans	ng/dscm at 7% O_2	25	33

ng/dscm- nanograms per dry standard cubic meter
O_2 - oxygen

ED_005878_00000192-00002

TABLE OF CONTENTS

EXECUTIVE SUMMARY 2

TABLE OF CONTENTS 3

CERTIFICATION FROM RESPONSIBLE OFFICIAL 4

REVIEW AND CERTIFICATION 5

1.0 INTRODUCTION 6
- 1.1 Project Summary and Objectives 6
- 1.2 Project Contacts 7
- 1.3 Testing Personnel 7

2.0 SOURCE DESCRIPTION 8
- 2.1 Facility Description 8
- 2.2 Emission Source Description 8

3.0 EMISSION TEST RESULTS 9
- 3.1 Summary of Results 9
- 3.2 Operating Conditions 9
- 3.3 Field Observations 10

4.0 EMISSION TEST METHODS AND PROCEDURES 11
- 4.1 Testing Methods and Procedures 11
- 4.2 Sample Handling and Analytical Procedures 12

LIST OF TABLES AND FIGURES

Table 1: Results Summary 2
Table 2: Project Matrix 6
Table 3: Method 23 Results 9
Figure 1: Example Method 23 Sample Train 11

LIST OF APPENDICES

APPENDIX A: METHOD 23 TEST DATA
APPENDIX B: GASEOUS TEST DATA
APPENDIX C: LABORATORY REPORTS
APPENDIX D: PLANT OPERATING RECORDS
APPENDIX E: CALIBRATIONS AND CERTIFICATIONS

CERTIFICATION FROM RESPONSIBLE OFFICIAL

I have reviewed the information being submitted in its entirety. Based on information and belief formed after reasonable inquiry, I certify that the statements and information contained in this submittal are true, accurate, and complete.

Signature

12/22/2020
Date

Gary Kippur
Name (printed)

Manager
Title

Tucson Iron + Metal
Company

ED_005878_00000192-00004

REVIEW AND CERTIFICATION

All work, calculations, other activities, and tasks performed and documented in this report were carried out under my direction and supervision. This test project conforms to the requirements of Bison Engineering, Inc.'s quality manual and American Society for Testing and Materials (ASTM) D7036-04.

Project Reviewer: Mark Severson

Title: Arizona Branch Manager

Signature: Mark Severson

Date: 12/22/2020

I have reviewed all testing details, calculations, results, conclusions, and other appropriate written material contained herein, and hereby certify that the presented material is authentic and accurate.

Technical Reviewer: Kelly Dorsi, PhD

Title: Atmospheric Scientist / Quality Manager

Signature: Kelly Dorsi

Date: 12/22/2020

ED_005878_00000192-00005

1.0 INTRODUCTION

1.1 Project Summary and Objectives

Tucson Iron & Metal (TIM) retained Bison Engineering, Inc. (Bison) to perform an emissions retest for dioxins and furans on the Contraband Incinerator exhaust stack at their facility in Tucson, Arizona. Testing was performed pursuant to Pima County Department of Environmental Quality (PDEQ) Air Quality Permit 127 and Title 40 Code of Federal Regulations (CFR) Part 60, Subpart EEEE. Bison employed U.S. Environmental Protection Agency (EPA) test methods as described in Title 40 CFR Part 60, Appendix A. Moisture, stack gas flow, O_2 and carbon dioxide (CO_2) were also measured to satisfy EPA Method 23. Table 2 summarizes the test methods used during the test campaign.

Table 2: Project Matrix

Tucson Iron and Metal Project Matrix November 24, 2020			
Source	**EPA Method**	**Parameter**	**Test Plan and Comments**
Contraband Incinerator	1	Measurement Location	Completed once prior to testing
	2	Flow	Concurrent with isokinetic sampling
	3A	O_2/CO_2	Three 1-hour test runs concurrent with isokinetic testing.
	4	Moisture	1-hour test runs concurrent with isokinetic sampling
	23	Dioxins/Furans	Three 1-hour test runs

ED_005878_00000192-00006

1.2 Project Contacts

Facility:	**Tucson Iron and Metal**
Address:	4484 East Tennessee Street
	Tucson, AZ 85714
Contact:	Gary Kippur
Phone:	Office (520) 884-1554
Email:	gary@tucsoniron.net

Consultant:	**Bison Engineering, Inc.**
Address:	4251 S. Station Master Dr.
	Tucson, AZ 85714
Contact:	Mark Severson
Phone:	Office (520) 749-2176
Email:	mseverson@bison-eng.com

State Authority:	**Pima County Department of Environmental Quality**
Address:	33 N. Stone Ave, Suite 700
	Tucson, AZ 85701
Contact:	Jacqueline Ronstadt
Phone:	Office (520) 724-7400
Email:	jacqueline.ronstadt@pima.gov

Contract Laboratory: ALS Environmental- Houston HRMS

Address:	10450 Stancliff Rd, Suite 210
	Houston, TX
Contact:	Corey Grandits
Phone:	Office (281) 530-5656
Email:	Corey.Grandits@alsglobal.com

1.3 Testing Personnel

The Bison on-site testing team was led by L. Connor Everly, Qualified Individual (QI), Staff Engineer. Connor was assisted during field testing by Angel Medina, Qualified Individual (QI), Environmental Scientist, and Mark Severson, P.E., Arizona Branch Manager. Connor served as project manager. Connor processed the test data and authored this report. Kelly Dorsi, PhD, Atmospheric Scientist, performed a final quality assurance review of the data and test report.

Gary Kippur, owner, was the primary contact for TIM. Gary was not present on-site for the duration of the re-test. TIM staff members were responsible for monitoring process parameters during testing.

PDEQ representative, Joanne Sufi, was present on-site for a portion of the re-test campaign.

2.0 SOURCE DESCRIPTION

2.1 Facility Description

TIM owns and operates a metal recycling facility that serves the greater Tucson area. In addition to recycling, the facility operates a contraband incineration unit that destroys substances collected by law enforcement.

2.2 Emission Source Description

The contraband incinerator burns less than 35 tons per day and is classified as an Other Solid Waste Incinerator (OSWI). Materials destroyed by the incinerator are limited to marijuana, cocaine, methamphetamine, pharmaceuticals, wood, paper, burlap or fabric, and associated wrapping materials.

Incinerator process off-gases are controlled by an afterburner and the use of good combustion practices. A trona or sodium carbonate sorbent injection system provides additional control of SO_2 and HCl emissions. A baghouse is installed on the exhaust to control emissions of PM and opacity.

The contraband fed into the OSWI unit is primarily combustible carbonaceous vegetative material. Upon thermal oxidation, the materials are broken down into CO_2 and water along with minor amounts of other products of combustion (POC) such as NO_x, PM, volatile organic compounds (VOC), HCl and SO_2. Narcotics and plastic wrapping materials may contain mineral and/or chlorinated compounds, which contribute to ash, HCl and SO_2 formation. Occasionally upon incineration, sulfur compounds such as grease or oil coatings on the packaging are emitted as PM and SO_2. TIM utilizes sorbent injection following the afterburner for the control of SO_2 and HCl. The contraband feed rate of no more than 2,000 pounds per hour (lb/hr) of marijuana and 30 lb/hr of narcotics restricts the available amount of chemical constituents that result in POC from the combustion process. The afterburner that follows the primary combustion chamber maintains a minimum temperature of 1,400 degrees Fahrenheit (°F) whenever introducing contraband. This temperature is sufficient to ensure complete combustion of any partial combustion products remaining in the effluent from the primary combustion chamber.

The induction blower configuration of the baghouse system (with fresh air makeup vents built into the incinerator exhaust ductwork) is balanced to allow the exhaust ductwork system to operate under negative pressure. Fresh air drawn into the exhaust duct allows the cooling of the hot incinerator exhaust before its introduction into the baghouse, protecting the filter fabric from thermal degradation. Pressure drop across the filter media is monitored for proper particulate emissions control efficiency in the baghouse.

TIM's OSWI typically operates two to three days per week on a schedule coordinated with Customs and Border Protection or other law enforcement agencies under contract with the company.

The Contraband Incinerator exhaust stack is approximately 35 feet tall and 44 inches inner diameter. Two test ports were accessed via the top of the baghouse. While on-site, Bison verified the exhaust stack meets EPA Method 1 specifications; detailed Method 1 information is included in the appendices to this report.

ED_005878_00000192-00008

3.0 EMISSION TEST RESULTS

3.1 Summary of Results

Table 3 summarizes the Contraband Incinerator test results reported on a Toxicity Equivalency (TEQ) basis using 2005 World Health Organization toxicity equivalency factors (TEFs). Results are corrected to 7% O_2. Additional supporting material, including raw data, laboratory data with and without applied TEFs, plant data, example calculations and calibration records, can be found in the appendices to this report. Methods 1, 2, 3A, 4, and 23 were performed on November 24, 2020.

Table 3: Method 23 Results

Tucson Iron and Metal Contraband Incinerator Method 23 Test Results November 24, 2020						
Parameter	**Units**	**Run 1**	**Run 2**	**Run 3**	**Average**	**Limit**
Run Start Time		9:05	10:59	12:54		
Run End Time		10:18	12:20	14:00		
Run Duration	minutes	60	60	60	**60**	
Velocity	FPS	47.98	52.25	53.36	**51.20**	
H_2O	%v	3.43	2.82	1.81	**2.69**	
CO_2	%vd	1.65	1.81	1.90	**1.79**	
O_2	%vd	18.99	18.85	18.75	**18.86**	
Sample Volume	dscm	1.322	1.292	1.308	**1.307**	
Isokinetic Average	%	100.9	99.6	99.6	**100.0**	
Stack Temp	F	221.2	241.4	254.3	**239.0**	
Dioxins/Furans*	ng/dscm	7	29	40	**25**	**33**

*Test results are reported on a TEQ basis and corrected to 7% O_2.
FPS – feet per second
%v – percent by volume
%vd – percent by volume dry basis
dscm – Dry standard cubic meter

3.2 Operating Conditions

Representatives of TIM recorded details of plant operations during testing. TIM personnel compiled the raw process data and provided it to Bison for use in this report. Process data is presented in the report appendices.

3.3 Field Observations

Testing was performed as outlined in the test protocol dated June 19, 2020. No adverse or unusual environmental conditions were noted that are known to have influenced the outcome of these tests.

After Method 23 run 1, the nozzle was broken upon exiting the stack after completing the first run. A new nozzle was used for the second run. The second nozzle was lost in the stack during run 2. Run 2 was paused immediately upon the loss of the nozzle and replaced with one of identical size. Run 2 was then resumed and completed. Bison does not believe these changes affected the test results.

ED_005878_00000192-00010

4.0 EMISSION TEST METHODS AND PROCEDURES

4.1 Testing Methods and Procedures

Bison testing personnel performed the following EPA methods as described in Title 40 CFR 60, Appendix A.

EPA Reference Method 1, "Sample and Velocity Traverses for Stationary Sources." The objective of Method 1 is to determine a suitable location for testing and to determine the velocity and/or sample points for the source. The results of Method 1 sampling location and sample or velocity point measurement locations are included in the appendices.

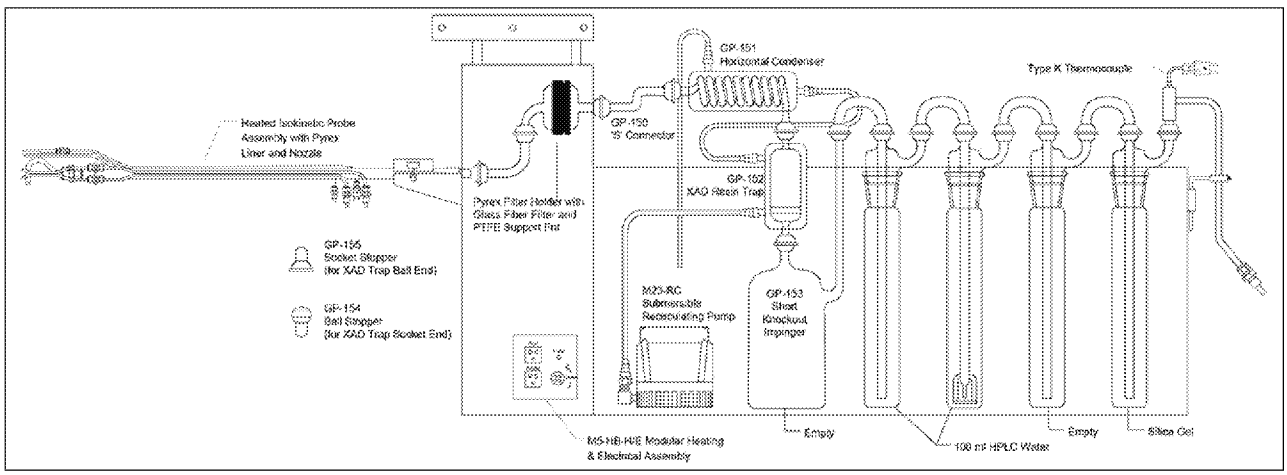
EPA Reference Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type-S Pitot Tube)." The objective of Method 2 is to determine volumetric flow. The average velocity, temperature, static pressure, and source area are used to calculate volumetric flow for the source. This method is incorporated within the performance of Method 23.

EPA Reference Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)." The objective of Method 3A is to determine the O_2 and CO_2 concentrations in the stack gas stream.

EPA Reference Method 4, "Determination of Moisture Content in the Stack Gases." The objective of Method 4 is to determine the moisture content of a gas stream. This method is incorporated within the performance of Method 23.

EPA Reference Method 23, "Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources." The objective of Method 23 is to determine the polychlorinated dibenzo-p-dioxins (PCDD's) and polychlorinated dibenzofurans (PCDF's) emissions from a stationary source. Method 23 is an isokinetic sampling method similar to Method 5. The sample is collected in the probe, on a glass fiber filter and on a packed column of absorbent material. The PCDD/PCDF are extracted from the sample, separated by high resolution gas chromatography, and measured by high resolution mass spectrometry. Figure 1 depicts an example of the Method 23 sample train.

Figure 1: Example Method 23 Sample Train



ED_005878_00000192-00011

4.2 Sample Handling and Analytical Procedures

All analytical procedures complied with EPA methodology. Method 23 samples were sent to ALS Environmental in Houston, Texas. The report from ALS can be found in the appendices.

ED_005878_00000192-00012

APPENDIX A: METHOD 23 DATA

ED_005878_00000192-00013

BISON ENGINEERING, INC.

COMPANY	**Tucson Iron and Metal**
FACILITY	**Metal Recycling Facility**
LOCATION	**Tucson, AZ**
SOURCE	**Contraband Incinerator**
DATE	**11/24/20**
METHOD	**M23**
POLLUTANT	**Dioxins and Furans**

EPA Method 1
Stack Parameters and Traverse Points

Client: **Tucson Iron and Metal**
Location: **Tucson, AZ**
Source: **Contraband Incinerator**
Facility: **Metal Recycling Facility**

Type of Testing: P (P for Particulate; V for Velocity/Nonparticulate)
Type of Duct: C (C for circular; R for rectangular)

Number of ports available: 2
Number of ports to be used: 2
Port diameter: 4 inches

Circular ID (Rectangular Depth): 44.00 inches
Port depth and/or wall thickness: 4.00 inches
Stack width (Rectangular only): inches

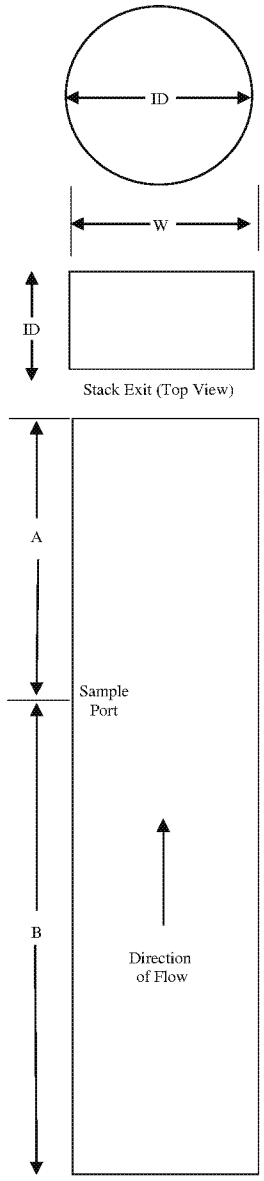
Equivalent Diameter
If rectangluar = $\frac{2*Depth*Width}{Depth + Width}$ = 44.00 inches (If circular = duct ID)
Stack/duct area = 10.559 sq.feet 1520.5 sq.inches

Sample Port Location:	Downstream from flow disturbance from process	Upstream from flow disturbance toward exit
	B	A
Number of Inches:	264.00	156.00
Number of Diameters:	6.00	3.55

Minimum Number of Traverse Points: 20

Points	% of diameter	Distance from inside wall (in.)	Distance including port (in.)
1	2.6	1.14	5 1/8
2	8.2	3.61	7 5/8
3	14.6	6.42	10 3/8
4	22.6	9.94	14
5	34.2	15.05	19
6	65.8	28.95	33
7	77.4	34.06	38
8	85.4	37.58	41 5/8
9	91.8	40.39	44 3/8
10	97.4	42.86	46 7/8

Reference Diagram



Drawing NOT to scale and NOT an acurate representation of stack.

Pre Traverse Flow Information

Client: Tucson Iron and Metal
Location: Tucson, AZ
Source: Contraband Incinerator

Stack Temp: 230 F

Traverse Point	Velocity ΔP ("H_2O)	Null Angle
1	0.48	2.0
2	0.49	1.0
3	0.40	1.0
4	0.50	1.0
5	0.45	3.0
6	0.35	3.0
7	0.38	4.0
8	0.40	4.0
9	0.33	10.0
10	0.21	9.0
11	0.53	5.0
12	0.30	1.0
13	0.27	2.0
14	0.40	7.0
15	0.45	5.0
16	0.45	3.0
17	0.43	4.0
18	0.48	6.0
19	0.45	5.0
20	0.39	3.0
Average:	0.41	4.0

Flow is found to be:
Non-cyclonic x
Cyclonic

Isokinetic Field Data
Field Data Entry

Client:	**Tucson Iron and Metal**	**Run:**	**1**
Location:	**Tucson, AZ**	**Start Time:**	**9:05**
Source:	**Contraband Incinerator**	**End Time:**	**10:18**
EPA Method:	**M23**	**Date:**	**11/24/2020**
Box Operator:	**AM**	**Environmental Conditions/Test Notes:**	
Technician(s):	**LCE, MS**	60-80 degrees Farenheit, Sunny	

Stack Dimensional Data:

Circular	
Diameter	44.000 in
Rectangular	
Width	in
Length	in
Stack Area	10.559 sq.ft.

Equipment:

Meterbox ID	Box 8	Probe ID	T-4-2	Liner type	Glass
Y factor	0.9740	Nozzle ID	100	Nozzle size	0.2682 inches
ΔH@	1.918	Hot box ID	HB-1	Nozzle area	0.000392 sq.ft.
		Pitot Cp	0.84	Probe heat	250 F
		Pitot ID	T-PT-4	Filter heat	250 F

Source Information:

Barometric Pressure	27.31 "Hg	O_2	18.84 %
Static Pressure	0.3 "H_2O	CO_2	1.65 %
Ave. ΔP	0.407 "H_2O	Rec. Nz.	0.269 inches
Stack Temperature	230 F		
Assumed moisture	3 %		
Assumed meter temp.	65 F		
Total number of points	20		
Time per point	3		
Total run time	60		

Leak Checks:

	Pre-test	Post-test
Pitot	x	x
Train leak rate, dcf	0.001	0.002
Leak check vacuum, "Hg	15	15

Nozzle check for roundness:

1	2	3	
0.268	0.269	0.268	inches
	Caliper ID#	TMC-2	

Post Test Calculations:

Sample volume	52.287 dcf	Ave. ΔP	0.522 "H_2O
Wet mol. weight	28.64 M_s (actual)	Ave. √ΔP	0.7163 "H_2O
Actual H_2O	3.43 %	Ave. ΔH	2.338 "H_2O
Std. meter vol.	46.697 dscf	Ave. T_s	221.2 °F
Isokinetic Average	100.9 %	Ave. T_m	68.7 °F

Moisture/Lab:

Filter	1 #		
	Initial	Final	Gain
Impingers, g	2458.2	2487.4	29.2
Silica gel, g	875.7	881.7	6.0
		Total water gain:	35.2

Traverse Point	Time (min.)	Meter Volume (dcf) 117.688	Velocity ΔP ("H_2O)	Stack Temp. (°F)	Meter Temp. (°F)	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser Temp (≤68°F)	XAD Trap Temp
1	3.0	120.170	0.38	156	66	1.88	1.90	6	248	51	52
2	6.0	122.815	0.60	221	67	2.68	2.70	10	258	50	53
3	9.0	125.660	0.60	225	67	2.67	2.70	10	255	55	54
4	12.0	128.580	0.71	226	67	3.15	3.15	11	244	62	48
5	15.0	131.650	0.75	227	67	3.33	3.30	14	258	66	46
6	18.0	134.420	0.55	228	67	2.44	2.40	11	240	68	46
7	21.0	136.860	0.46	228	68	2.04	2.00	9.5	255	67	45
8	24.0	139.255	0.42	227	68	1.87	1.90	9.5	270	65	44
9	27.0	141.580	0.39	225	68	1.74	1.75	9	254	64	43
10	30.0	143.758	0.35	223	68	1.56	1.55	8.5	261	62	43
11	33.0	145.830	0.30	204	68	1.38	1.40	8.5	259	56	47
12	36.0	148.075	0.38	217	69	1.72	1.70	9	249	54	45
13	39.0	150.460	0.43	226	70	1.92	1.90	9.5	257	55	45
14	42.0	153.100	0.55	228	70	2.45	2.50	11	252	57	45
15	45.0	155.920	0.57	227	70	2.54	2.55	13	252	58	45
16	48.0	158.990	0.75	229	70	3.34	3.30	14	262	59	46
17	51.0	162.060	0.70	230	71	3.12	3.10	14	246	58	46
18	54.0	164.930	0.60	227	71	2.68	2.70	13	250	57	47
19	57.0	167.600	0.55	226	71	2.46	2.45	11	259	55	46
20	60.0	169.975	0.40	223	71	1.80	1.80	9	250	54	47

Isokinetic Field Data
Field Data Entry

Client:	**Tucson Iron and Metal**		**Run:**	**2**
Location:	**Tucson, AZ**		**Start Time:**	**10:59**
Source:	**Contraband Incinerator**	**Environmental Conditions/Test Notes:**	**End Time:**	**12:20**
EPA Method:	**M23**	60-80 degrees Farenheit, Sunny	**Date:**	**11/24/2020**
Box Operator:	**AM**	New nozzle due to broken nozzle post run 1.		
Technician(s):	**LCE, MS**	Mid -run leak check due to mid-run nozzle break. Switched to nozzle of the same average size.		

Stack Dimensional Data:

Circular	
Diameter	44.000 in
Rectangular	
Width	in
Length	in
Stack Area	10.559 sq.ft.

Equipment:

Meterbox ID	Box 8	Probe ID	T-4-2	Liner type:	Glass		
Y factor	0.9740	Nozzle ID	101/258	Nozzle size:	0.2584 inches	R. Nozzle size	0.2584 inches
ΔH@	1.918	Hot box ID	HB-1	Nozzle area:	0.000364 sq.ft.	R. Nozzle Area	0.000364 sq.ft.
		Pitot Cp	0.84	Probe heat:	250 F		
		Pitot ID	T-PT-4	Filter heat:	250 F		

Source Information:

Barometric Pressure	27.35 "Hg	O_2	18.71 %
Static Pressure	0.3 "H_2O	CO_2	1.81 %
Ave. ΔP	0.52 "H_2O	Rec. Nz.	0.252 inches
Stack Temperature	220 F		
Assumed moisture	3.43 %		
Assumed meter temp.	68.7 F		
Total number of points	20		
Time per point	3		
Total run time	60		

Leak Checks:

	Pre-test	Post-test
Pitot:	x	x
Train leak rate, dcf:	0.010	0.009
Leak check vacuum, "Hg:	20	20

Nozzle check for roundness:

1	2	3	
0.259	0.258	0.258	inches
	Caliper ID#	TMC-2	

Replacement nozzle check:

1	2	3
0.259	0.258	0.258
	inches	

Post Test Calculations:

Sample volume	51.492 dcf	Ave. ΔP	0.602 "H_2O
Wet mol. weight	28.73 M_s (actual)	Ave. √ΔP	0.7704 "H_2O
Actual H_2O	2.82 %	Ave. ΔH	2.25 "H_2O
Std. meter vol.	45.611 dscf	Ave. T_s	241.4 °F
Isokinetic Average	99.6 %	Ave. T_m	73.7 °F

Moisture/Lab:

Filter	2 #		
	Initial	Final	Gain
Impingers, g	2412.3	2426.5	14.2
Silica gel, g	984.3	998.2	13.9
		Total water gain:	28.1

Traverse Point	Time (min.)	Meter Volume (dcf) 170.419	Velocity ΔP ("H_2O)	Stack Temp. (°F)	Meter Temp. (°F)	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser Temp (≤68°F)	XAD Trap Temp	Mid-run restart vol. (dcf)
1	3.0	172.475	0.35	160	71	1.48	1.50	8	240	64	26	
2	6.0	174.700	0.40	170	71	1.67	1.70	9	250	56	47	
3	9.0	177.115	0.50	220	72	1.94	2.00	12	240	55	46	
4	12.0	179.635	0.55	225	72	2.11	2.10	12	242	57	46	180.435
5	15.0	182.840	0.55	226	72	2.11	2.10	12	248	52	48	
6	18.0	185.620	0.72	250	74	2.68	2.70	14	247	52	47	
7	21.0	188.400	0.70	256	74	2.58	2.60	14	254	54	47	
8	24.0	191.210	0.70	252	74	2.60	2.60	14	253	56	47	
9	27.0	193.975	0.65	255	75	2.41	2.40	14	257	59	47	
10	30.0	196.549	0.57	256	75	2.11	2.10	13	256	60	47	
11	33.0	198.300	0.30	230	76	1.15	1.15	7	249	58	52	
12	36.0	200.770	0.55	252	76	2.05	2.00	13	250	54	46	
13	39.0	203.235	0.55	256	75	2.03	2.00	13	252	53	45	
14	42.0	205.950	0.67	257	74	2.47	2.50	14	251	54	45	
15	45.0	208.620	0.69	260	74	2.53	2.50	14	252	54	44	
16	48.0	211.490	0.70	261	74	2.56	2.55	14	251	55	45	
17	51.0	214.300	0.74	262	74	2.71	2.70	14	250	55	47	
18	54.0	216.990	0.70	259	74	2.57	2.60	14	253	55	46	
19	57.0	219.910	0.72	260	73	2.64	2.60	14	251	54	46	
20	60.0	222.711	0.72	260	73	2.64	2.60	14	240	54	46	

Isokinetic Field Data
Field Data Entry

Client:	**Tucson Iron and Metal**		**Run:**	**3**
Location:	**Tucson, AZ**		**Start Time:**	**12:54**
Source:	**Contraband Incinerator**		**End Time:**	**14:00**
EPA Method:	**M23**		**Date:**	**11/24/2020**
Box Operator:	**AM**	**Environmental Conditions/Test Notes:**		
Technician(s):	**LCE, MS**	60-80 degrees Farenheit, Sunny		

Stack Dimensional Data:

Circular		
Diameter	44.000	in
Rectangular		
Width		in
Length		in
Stack Area	10.559	sq.ft.

Equipment:

Meterbox ID	Box 8	Probe ID	T-4-2	Liner type:	Glass
Y factor	0.9740	Nozzle ID	258	Nozzle size:	0.2584 inches
ΔH@	1.918	Hot box ID	HB-1	Nozzle area:	0.000364 sq.ft.
		Pitot Cp	0.84	Probe heat:	250 F
		Pitot ID	T-PT-4	Filter heat:	250 F

Source Information:

Barometric Pressure	27.34	"Hg	O_2	18.61 %
Static Pressure	0.3	"H_2O	CO_2	1.90 %
Ave. ΔP	0.602	"H_2O	Rec. Nz.	0.241 inches
Stack Temperature	220	F		
Assumed moisture	2.82	%		
Assumed meter temp.	73.7	F		
Total number of points	20			
Time per point	3			
Total run time	60			

Leak Checks:

	Pre-test	Post-test
Pitot:	x	x
Train leak rate, dcf:	0.015	0.017
Leak check vacuum, "Hg:	18	18

Nozzle check for roundness:

1	2	3	
0.259	0.258	0.258	inches
	Caliper ID#	TMC-2	

Post Test Calculations:

Sample volume	52.151	dcf	Ave. ΔP	0.623 "H_2O
Wet mol. weight	28.85	M_s (actual)	Ave. √ΔP	0.7812 "H_2O
Actual H_2O	1.81	%	Ave. ΔH	2.288 "H_2O
Std. meter vol.	46.200	dscf	Ave. T_s	254.3 °F
Isokinetic Average	99.6	%	Ave. T_m	73.5 °F

Moisture/Lab:

Filter	3 #		
	Initial	Final	Gain
Impingers, g	2487.4	2496.1	8.7
Silica gel, g	881.7	891.1	9.4
		Total water gain:	18.1

Traverse Point	Time (min.)	Meter Volume (dcf) 223.544	Velocity ΔP ("H_2O)	Stack Temp. (°F)	Meter Temp. (°F)	Calc. ΔH	Run ΔH	Vacuum ("Hg)	Filter Box (°F)	Condenser Temp (≤68°F)	XAD Trap Temp
1	3.0	225.650	0.32	184	72	1.32	1.30	7	270	68	65
2	6.0	227.820	0.40	210	72	1.59	1.60	6.5	260	67	52
3	9.0	229.970	0.40	255	72	1.49	1.50	7	270	66	47
4	12.0	232.195	0.45	258	72	1.67	1.65	7.5	235	67	47
5	15.0	234.680	0.60	260	72	2.22	2.20	9	250	63	46
6	18.0	237.455	0.70	261	73	2.59	2.55	13.5	250	58	43
7	21.0	240.330	0.75	264	73	2.76	2.70	14	255	56	42
8	24.0	243.340	0.85	265	73	3.12	3.00	14.5	257	54	42
9	27.0	246.320	0.80	265	74	2.94	2.90	14.5	259	54	43
10	30.0	248.911	0.60	263	74	2.21	2.20	12.5	259	52	43
11	33.0	251.030	0.39	235	74	1.50	1.50	7	252	49	42
12	36.0	253.290	0.48	258	74	1.78	1.80	8	255	47	41
13	39.0	255.640	0.53	261	74	1.96	1.95	9.5	258	48	43
14	42.0	258.200	0.60	261	74	2.22	2.20	11	265	48	43
15	45.0	261.120	0.78	263	74	2.88	2.85	14	261	49	44
16	48.0	264.110	0.80	264	74	2.95	2.90	14.5	249	50	45
17	51.0	267.165	0.85	266	74	3.12	3.10	15	265	51	46
18	54.0	270.165	0.80	266	74	2.94	2.90	15	252	51	46
19	57.0	273.050	0.75	264	75	2.77	2.75	14	253	51	46
20	60.0	275.695	0.60	263	75	2.22	2.20	11.5	241	51	45

Isokinetic Field Data
Field Data and Calculations
Emissions and Gas Stream Characteristics

Client:	**Tucson Iron and Metals**	**Run:**	**1**
Location:	**Tucson, AZ**	**Start Time:**	**9:05**
Source:	**Contraband Incinerator**	**End Time:**	**10:18**
Method:	**23**	**Date:**	**11/24/2020**

Sampling Data				Traverse Data			
Time min.	Meter ft^3	ΔH $''H_2O$	Meter T_m °F	Traverse Point	Dp $''H_2O$	Stack T_s °F	√Dp
	117.688						
3.0	120.170	1.90	66	1	0.38	156	0.6164
6.0	122.815	2.70	67	2	0.60	221	0.7746
9.0	125.660	2.70	67	3	0.60	225	0.7746
12.0	128.580	3.15	67	4	0.71	226	0.8426
15.0	131.650	3.30	67	5	0.75	227	0.8660
18.0	134.420	2.40	67	6	0.55	228	0.7416
21.0	136.860	2.00	68	7	0.46	228	0.6782
24.0	139.255	1.90	68	8	0.42	227	0.6481
27.0	141.580	1.75	68	9	0.39	225	0.6245
30.0	143.758	1.55	68	10	0.35	223	0.5916
33.0	145.830	1.40	68	11	0.30	204	0.5477
36.0	148.075	1.70	69	12	0.38	217	0.6164
39.0	150.460	1.90	70	13	0.43	226	0.6557
42.0	153.100	2.50	70	14	0.55	228	0.7416
45.0	155.920	2.55	70	15	0.57	227	0.7550
48.0	158.990	3.30	70	16	0.75	229	0.8660
51.0	162.060	3.10	71	17	0.70	230	0.8367
54.0	164.930	2.70	71	18	0.60	227	0.7746
57.0	167.600	2.45	71	19	0.55	226	0.7416
60.0	169.975	1.80	71	20	0.40	223	0.6325

Client:	**Tucson Iron and Metals**	**Run:**	**1**
Source:	**Contraband Incinerator**	**Date:**	**11/24/20**

Field Data Input Continued

Moisture Data		Stack Dimensional Data:	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V_m	52.287 dcf	Rectangular	
Water Volume	35.2 ml (g)	Width	in
Nozzle Diameter, N_z	0.2682 in.	Length	in
Nozzle Area	0.000392 sq.ft.	Stack Area	10.559 sq.ft.

Traverse Data		Molecular Weight:	
Barometric Pressure, P_b	27.31 "Hg	CO_2 Average	1.65 %vd
Static Pressure	0.30 "H_2O	O_2 Average	18.99 %vd
Pitot Factor, cp	0.84		
Meter Cal Factor	0.9740 Y		

Field Data Averages

Meter		Stack	
ΔH	2.338 "H_2O	√Dp	0.7163 "H_2O
Temperature, T_m	68.7 °F	Temperature, T_s	221.2 °F
Temperature, T_m	528.7 °A (°R)	Temperature, T_s	681.2 °A (R)
Pressure Meter, P_m	27.482 "Hg	Pressure Stack, P_s	27.332 "Hg

Field Data Calculations

Meter Box Capture		EPA Method 2 Stack Gas Flowrate:	
Standard Volume, $V_{m(std)}$	46.697 dscf	Velocity, V_s	47.98 fps
	1.322 dscm	Volume (actual)	30,397.2 acfm
Actual Volume, $V_{m(actual)}$	68.321 awcf		29,354.6 adcfm
Gas Stream Moisture		Volume (standard)	1,291,381.7 wscf/hr
Moisture Vapor, $Vw_{(std)}$	1.657 scf		1,247,087.3 dscf/hr
Moisture, B_{ws}	0.0343		20,784.8 dscf/min
Moisture EPA M4	3.43 %v		
EPA Method 3 Gas Density			
Dry, M_d	29.02 lb/lb-mole		
Wet, M_s	28.64 lb/lb-mole		
Percent Isokinetic	100.9 %		

Isokinetic Field Data
Field Data and Calculations
Particulate Emissions and Gas Stream Characteristics

Client:	**Tucson Iron and Metals**	**Run:**	**2**
Location:	**Tucson, AZ**	**Start Time:**	**10:59**
Source:	**Contraband Incinerator**	**End Time:**	**12:20**
Method:	**23**	**Date:**	**11/24/20**

Sampling Data				Traverse Data			
Time min.	**Meter ft^3**	**ΔH "H_2O**	**Meter T_m °F**	**Traverse Point**	**Dp "H_2O**	**Stack T_s °F**	**√Dp**
	170.419						
3.0	172.475	1.50	71	1	0.35	160	0.5916
6.0	174.700	1.70	71	2	0.40	170	0.6325
9.0	177.115	2.00	72	3	0.50	220	0.7071
12.0	179.635	2.10	72	4	0.55	225	0.7416
15.0	182.840	2.10	72	5	0.55	226	0.7416
18.0	185.620	2.70	74	6	0.72	250	0.8485
21.0	188.400	2.60	74	7	0.70	256	0.8367
24.0	191.210	2.60	74	8	0.70	252	0.8367
27.0	193.975	2.40	75	9	0.65	255	0.8062
30.0	196.549	2.10	75	10	0.57	256	0.7550
33.0	198.300	1.15	76	11	0.30	230	0.5477
36.0	200.770	2.00	76	12	0.55	252	0.7416
39.0	203.235	2.00	75	13	0.55	256	0.7416
42.0	205.950	2.50	74	14	0.67	257	0.8185
45.0	208.620	2.50	74	15	0.69	260	0.8307
48.0	211.490	2.55	74	16	0.70	261	0.8367
51.0	214.300	2.70	74	17	0.74	262	0.8602
54.0	216.990	2.60	74	18	0.70	259	0.8367
57.0	219.910	2.60	73	19	0.72	260	0.8485
60.0	222.711	2.60	73	20	0.72	260	0.8485

Client:	**Tucson Iron and Metals**	**Run:**	**2**
Source:	**Contraband Incinerator**	**Date:**	**11/24/20**

Field Data Input Continued

Moisture Data		Stack Dimensional Data:	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V_m	51.492 dcf	Rectangular	
Water Volume	28.1 ml (g)	Width	in
Nozzle Diameter, N_z	0.2584 in.	Length	in
Nozzle Area	0.000364 sq.ft.	Stack Area	10.559 sq.ft.

Traverse Data		Molecular Weight:	
Barometric Pressure, P_b	27.35 "Hg	CO_2 Average	1.81 %vd
Static Pressure	0.30 "H_2O	O_2 Average	18.85 %vd
Pitot Factor, cp	0.84		
Meter Cal Factor	0.9740 Y		

Field Data Averages

Meter		Stack	
ΔH	2.250 "H_2O	$\sqrt{Dp}$	0.7704 "H_2O
Temperature, T_m	73.7 ^oF	Temperature, T_s	241.4 ^oF
Temperature, T_m	533.7 ^oA (^oR)	Temperature, T_s	701.4 ^oA (R)
Pressure Meter, P_m	27.515 "Hg	Pressure Stack, P_s	27.372 "Hg

Field Data Calculations

Meter Box Capture		EPA Method 2 Stack Gas Flowrate:	
Standard Volume, $V_{m(std)}$	45.611 dscf	Velocity, V_s	52.25 fps
	1.292 dscm	Volume (actual)	33,102.5 acfm
Actual Volume, $V_{m(actual)}$	68.179 awcf		32,169.0 adcfm
Gas Stream Moisture		Volume (standard)	1,367,806.6 wscf/hr
Moisture Vapor, $Vw_{(std)}$	1.322 scf		1,329,234.5 dscf/hr
Moisture, B_{ws}	0.0282		22,153.9 dscf/min
Moisture EPA M4	2.82 %v		
EPA Method 3 Gas Density			
Dry, M_d	29.04 lb/lb-mole		
Wet, M_s	28.73 lb/lb-mole		
Percent Isokinetic	99.6 %		

Isokinetic Field Data
Field Data and Calculations
Particulate Emissions and Gas Stream Characteristics

Client:	**Tucson Iron and Metals**	**Run:**	**3**
Location:	**Tucson, AZ**	**Start Time:**	**12:54**
Source:	**Contraband Incinerator**	**End Time:**	**14:00**
Method:	**23**	**Date:**	**11/24/20**

Sampling Data				Traverse Data			
Time min.	Meter ft^3	ΔH $"H_2O$	Meter T_m °F	Traverse Point	Dp $"H_2O$	Stack T_s °F	√Dp
	223.544						
3.0	225.650	1.30	72	1	0.32	184	0.5657
6.0	227.820	1.60	72	2	0.40	210	0.6325
9.0	229.970	1.50	72	3	0.40	255	0.6325
12.0	232.195	1.65	72	4	0.45	258	0.6708
15.0	234.680	2.20	72	5	0.60	260	0.7746
18.0	237.455	2.55	73	6	0.70	261	0.8367
21.0	240.330	2.70	73	7	0.75	264	0.8660
24.0	243.340	3.00	73	8	0.85	265	0.9220
27.0	246.320	2.90	74	9	0.80	265	0.8944
30.0	248.911	2.20	74	10	0.60	263	0.7746
33.0	251.030	1.50	74	11	0.39	235	0.6245
36.0	253.290	1.80	74	12	0.48	258	0.6928
39.0	255.640	1.95	74	13	0.53	261	0.7280
42.0	258.200	2.20	74	14	0.60	261	0.7746
45.0	261.120	2.85	74	15	0.78	263	0.8832
48.0	264.110	2.90	74	16	0.80	264	0.8944
51.0	267.165	3.10	74	17	0.85	266	0.9220
54.0	270.165	2.90	74	18	0.80	266	0.8944
57.0	273.050	2.75	75	19	0.75	264	0.8660
60.0	275.695	2.20	75	20	0.60	263	0.7746

Client:	**Tucson Iron and Metals**	**Run:**	**3**
Source:	**Contraband Incinerator**	**Date:**	**11/24/20**

Field Data Input Continued

Moisture Data		Stack Dimensional Data:	
Total Test Time	60.0 min	Circular	
Sample Time Interval	3.0 min	Diameter	44.000 in
Meter Volume, V_m	52.151 dcf	Rectangular	
Water Volume	18.1 ml (g)	Width	in
Nozzle Diameter, N_z	0.2584 in.	Length	in
Nozzle Area	0.000364 sq.ft.	Stack Area	10.559 sq.ft.

Traverse Data		Molecular Weight:	
Barometric Pressure, P_b	27.34 "Hg	CO_2 Average	1.90 %vd
Static Pressure	0.30 "H_2O	O_2 Average	18.75 %vd
Pitot Factor, cp	0.84		
Meter Cal Factor	0.9740 Y		

Field Data Averages

Meter		Stack	
ΔH	2.288 "H_2O	√Dp	0.7812 "H_2O
Temperature, T_m	73.5 °F	Temperature, T_s	254.3 °F
Temperature, T_m	533.5 °A (°R)	Temperature, T_s	714.3 °A (R)
Pressure Meter, P_m	27.508 "Hg	Pressure Stack, P_s	27.362 "Hg

Field Data Calculations

Meter Box Capture		EPA Method 2 Stack Gas Flowrate:	
Standard Volume, $V_{m(std)}$	46.200 dscf	Velocity, V_s	53.36 fps
	1.308 dscm	Volume (actual)	33,805.7 acfm
Actual Volume, $V_{m(actual)}$	69.632 awcf		33,193.8 adcfm
Gas Stream Moisture		Volume (standard)	1,371,136.3 wscf/hr
Moisture Vapor, $Vw_{(std)}$	0.852 scf		1,346,318.7 dscf/hr
Moisture, B_{ws}	0.0181		22,438.6 dscf/min
Moisture EPA M4	1.81 %v		
EPA Method 3 Gas Density			
Dry, M_d	29.05 lb/lb-mole		
Wet, M_s	28.85 lb/lb-mole		
Percent Isokinetic	99.6 %		

EPA Method 23
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
Laboratory Results

Client: **Tucson Iron and Metals**
Location: **Tucson, AZ**
Source: **Contraband Incinerator**
Run: **1**

Run 1 O_2: 18.99 %
O_2 corrected to: 7.00 %

		Laboratory Results (pg)		Calculated Results		
Analyte Name	**TEF***	**Run 1**	**TEF Adjusted Result**	**ng**	**O_2 Corrected ng**	**O_2 Corrected ng/dscm**
2,3,7,8-TCDD	1	63.6	63.6	0.06	0.46	0.35
1,2,3,7,8-PeCDD	1	197	197	0.20	1.43	1.08
1,2,3,4,7,8-HxCDD	0.1	131	13.1	0.01	0.10	0.07
1,2,3,6,7,8-HxCDD	0.1	172	17.2	0.02	0.13	0.09
1,2,3,7,8,9-HxCDD	0.1	136	13.6	0.01	0.10	0.07
1,2,3,4,6,7,8-HpCDD	0.01	396	3.96	0.00	0.03	0.02
OCDD	0.0003	263	0.0789	0.00	0.00	0.00
2,3,7,8-TCDF	0.1	184	18.4	0.02	0.13	0.10
1,2,3,7,8-PeCDF	0.03	685	20.6	0.02	0.15	0.11
2,3,4,7,8-PeCDF	0.3	1720	516	0.52	3.76	2.84
1,2,3,4,7,8-HxCDF	0.1	1390	139	0.14	1.01	0.77
1,2,3,6,7,8-HxCDF	0.1	1210	121	0.12	0.88	0.67
1,2,3,7,8,9-HxCDF	0.1	300	30.0	0.03	0.22	0.17
2,3,4,6,7,8-HxCDF	0.1	1230	123	0.12	0.90	0.68
1,2,3,4,6,7,8-HpCDF	0.01	2720	27.2	0.03	0.20	0.15
1,2,3,4,7,8,9-HpCDF	0.01	272	2.72	0.00	0.02	0.01
OCDF	0.0003	526	0.158	0.00	0.00	0.00
	Totals:	**11,595.60**	**1,306.57**	**1.31**	**9.51**	**7.19**

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO.
Method 23, Section 9.9: any values reported as nondetected shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
Laboratory Results

Client: **Tucson Iron and Metals** Run 2 O_2: 18.85 %
Location: **Tucson, AZ** O_2 corrected to: 7.0 %
Source: **Contraband Incinerator**
Run: **2**

		Laboratory Results (pg)		Calculated Results		
Analyte Name	**TEF***	**Run 2**	**TEF Adjusted Result**	**ng**	**O_2 Corrected ng**	**O_2 Corrected ng/dscm**
2,3,7,8-TCDD	1	293	293	0.29	1.99	1.54
1,2,3,7,8-PeCDD	1	874	874	0.87	5.93	4.59
1,2,3,4,7,8-HxCDD	0.1	561	56.1	0.06	0.38	0.29
1,2,3,6,7,8-HxCDD	0.1	697	69.7	0.07	0.47	0.37
1,2,3,7,8,9-HxCDD	0.1	649	64.9	0.06	0.44	0.34
1,2,3,4,6,7,8-HpCDD	0.01	2570	25.7	0.03	0.17	0.13
OCDD	0.0003	1940	0.582	0.00	0.00	0.00
2,3,7,8-TCDF	0.1	1700	170	0.17	1.15	0.89
1,2,3,7,8-PeCDF	0.03	2450	73.5	0.07	0.50	0.39
2,3,4,7,8-PeCDF	0.3	6160	1848	1.85	12.53	9.70
1,2,3,4,7,8-HxCDF	0.1	5750	575	0.58	3.90	3.02
1,2,3,6,7,8-HxCDF	0.1	5040	504	0.50	3.42	2.65
1,2,3,7,8,9-HxCDF	0.1	1590	159	0.16	1.08	0.83
2,3,4,6,7,8-HxCDF	0.1	6230	623	0.62	4.22	3.27
1,2,3,4,6,7,8-HpCDF	0.01	14000	140	0.14	0.95	0.73
1,2,3,4,7,8,9-HpCDF	0.01	1660	16.6	0.02	0.11	0.09
OCDF	0.0003	4230	1.27	0.00	0.01	0.01
	Totals:	**56,394.00**	**5,494.35**	**5.49**	**37.25**	**28.83**

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO TEFs.
Method 23, Section 9.9: any values reported as nondetected shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
Laboratory Results

Client: **Tucson Iron and Metals**
Location: **Tucson, AZ**
Source: **Contraband Incinerator**
Run: **3**

Run 3 O_2: 18.75 %
O_2 corrected to: 7.0 %

		Laboratory Results (pg)		Calculated Results		
Analyte Name	**TEF***	**Run 3**	**TEF Adjusted Result**	**ng**	**O_2 Corrected ng**	**O_2 Corrected ng/dscm**
2,3,7,8-TCDD	1	748	748	0.75	4.84	3.70
1,2,3,7,8-PeCDD	1	1340	1340	1.34	8.66	6.62
1,2,3,4,7,8-HxCDD	0.1	797	79.7	0.08	0.52	0.39
1,2,3,6,7,8-HxCDD	0.1	980	98.0	0.10	0.63	0.48
1,2,3,7,8,9-HxCDD	0.1	904	90.4	0.09	0.58	0.45
1,2,3,4,6,7,8-HpCDD	0.01	3670	36.7	0.04	0.24	0.18
OCDD	0.0003	2760	0.828	0.00	0.01	0.00
2,3,7,8-TCDF	0.1	3710	371	0.37	2.40	1.83
1,2,3,7,8-PeCDF	0.03	4270	128	0.13	0.83	0.63
2,3,4,7,8-PeCDF	0.3	8420	2526	2.53	16.33	12.49
1,2,3,4,7,8-HxCDF	0.1	7540	754	0.75	4.87	3.73
1,2,3,6,7,8-HxCDF	0.1	6660	666	0.67	4.31	3.29
1,2,3,7,8,9-HxCDF	0.1	1770	177	0.18	1.14	0.87
2,3,4,6,7,8-HxCDF	0.1	7720	772	0.77	4.99	3.82
1,2,3,4,6,7,8-HpCDF	0.01	19700	197	0.20	1.27	0.97
1,2,3,4,7,8,9-HpCDF	0.01	1820	18.2	0.02	0.12	0.09
OCDF	0.0003	6570	1.97	0.00	0.01	0.01
	Totals:	**79,379.00**	**8,004.90**	**8.00**	**51.75**	**39.57**

*2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO TEFs.
Method 23, Section 9.9: any values reported as nondetected shall be counted as zero for the purpose of calculating total concentrations

EPA Method 23
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
Results Summary

Client: **Tucson Iron and Metals**
Source: **Contraband Incinerator**
Location: **Tucson, AZ**

Run			1	2	3	
Date			11/24/2020	11/24/2020	11/24/2020	
Run Start Time			9:05	10:59	12:54	
Run End Time			10:18	12:20	14:00	
Duration, min.			60	60	60	Average
Barometric Pressure, "Hg			27.31	27.35	27.34	**27.33**
Nozzle Dia., in.			0.2682	0.2584	0.2584	**0.2617**
Isokinetic Average, %			100.9	99.6	99.6	**100.0**
Sample Volume, dscf			46.697	45.611	46.200	**46.169**
Sample Volume, dscm			1.322	1.292	1.308	**1.307**
Stack Diameter, in.			44.00	44.00	44.00	**44.00**
Stack Area, sq.ft.			10.559	10.559	10.559	**10.559**
CO_2 %vd			1.65	1.81	1.90	**1.79**
O_2 %vd			18.99	18.85	18.75	**18.86**
Static Press., "H_2O			0.30	0.30	0.30	**0.30**
H_2O %v			3.43	2.82	1.81	**2.69**
Wet Molecular Weight, lb/lb-mole			28.64	28.73	28.85	**28.74**
Velocity, FPS			47.98	52.25	53.36	**51.20**
ADCFM			29,355	32,169	33,194	**31,573**
ACFM			30,397	33,103	33,806	**32,435**
DSCFM			20,785	22,154	22,439	**21,792**
Stack Temperature, °F			221.2	241.4	254.3	**239.0**
TEQ* Dioxins/Furans	TEF** Adjusted Totals	pg	1307	5494	8005	**4935**
		ng	1.31	5.49	8.00	**4.94**
	O_2 Corrected Totals***	ng	9.51	37.25	51.75	**32.84**
		ng/dscm	7.19	28.83	39.57	**25.20**

*Toxic equivalent
**2,3,7,8-TCDD Toxic Equivalence Factors, 2005 WHO.
***Corrected to 7 % O_2

EPA Methods 1-4, 23
Example Calculations

Client:	**Tucson Iron and Metals**	**Run:**	**1**
Location:	**Tucson, AZ**	**Start Time:**	**9:05**
Source:	**Contraband Incinerator**	**End Time:**	**10:18**
Method:	**23**	**Date:**	**11/24/2020**

EPA Methods 1-4:

1) $P_m = Pb + (\Delta H/13.6) =$ 27.482 "Hg

where Pb: 27.31 "Hg
ΔH: 2.338 "H_2O

2) Ps = Pb + (Static Press./13.6) = 27.332 "Hg

where Pb: 27.31 "Hg
Static Press.: 0.30 "H_2O

3) $V_m(std) = V_m(17.64)(Y)\left(\frac{Pm}{Tm}\right) =$ 46.697 dscf

where Vm: 52.287 dcf
Y: 0.9740
Pm: 27.482 "Hg
Tm: 528.7 °A

4) $V_w(std) = (0.04706)(H_2O) =$ 1.657 scf

where H_2O: 35.20 g

5) $Bws = \left(\frac{Vw(std)}{Vw(std)+Vm(std)}\right) =$ 0.0343

where Vw(std): 1.657 scf
Vm(std): 46.697 dscf

6) % H_2O = Bws x 100 = 3.43 %v

7) $V_m(actual) = \left(\frac{Y \times Vm}{(1-Bws)}\right)\left(\frac{Ts}{Tm}\right)\left(\frac{Pm}{Ps}\right) =$ 68.321 awcf

where Y: 0.9740
Vm: 52.2870 dcf
Bws: 0.0343
Ts: 681.2 °A
Tm: 528.7 °A
Pm: 27.482 "Hg
Ps: 27.332 "Hg

8) $M_d = 0.44(CO_2) + 0.32(O_2) + 0.28(N_2 + CO) =$ 29.02 lb/lb-mole

where CO_2: 1.65 %vd
O_2 18.99 %vd
N_2+CO= (100-(O_2+CO_2): 79.36 %vd

9) $M_s = M_d(1 - Bws) + (18 \times Bws) =$ 28.64 lb/lb-mole
where M_d: 29.02 lb/lb-mole
Bws: 0.0343

10) Stack Area(cir.) = 3.1416 (stack diameter/24)^2 = 10.559 sq. ft.
where Stack ID: 44 inches

Stack Area(rect.) = stack width/12 x stack length/12 = NA sq. ft.
where Stack Width: 0.000 inches
Stack Length: 0.000 inches

11) Velocity, $V_s = 85.49(Cp)(\text{Ave. Sqrt } \Delta P)\left(\sqrt{\frac{Ts}{(Ps \times Ms)}}\right) =$ 47.98 fps
where Cp: 0.84
Ave. Sqrt ΔP: 0.7163
Ts: 681.2 °A
Ps: 27.332 "Hg
Ms: 28.64 lb/lb-mole

12) ACFM = (V_s)(stack area)(60 sec/min) = 30,397.2 ACFM
where V_s: 47.98 ft/sec
Stack Area: 10.559 sq. ft

13) ADCFM = (ACFM)(1-Bws) = 29,354.6 ADCFM
where ACFM: 30,397.2
Bws: 0.0343

14) $Qsw = 3600(V_s)(\text{stack area})\left(\frac{528°A}{Ts}\right)\left(\frac{Ps}{29.92\text{ "Hg}}\right) =$ 1,291,381.7 wscf/hr
where V_s: 47.98 ft/sec
Stack Area: 10.5590 sq. ft.
Ts: 681.2 °A
Ps: 27.332 "Hg

15) Qsd = (wscf/hr)(1-Bws) = 1,247,087.3 dscf/hr
where wscf/hr: 1,291,381.7
Bws: 0.0343

16) DSCFM= (dscf/hr)/60 mins/hr = 20,784.8 DSCFM
where dscf/hr: 1,247,087.3

17) Nozzle Area = 3.1416 (Nozzle Size/24)^2 = 0.000392 sq. ft.
where Nozzle Size: 0.2682 inches

18) Isokinetic % = $\left(\frac{0.0945(Ts)(Vm(std))}{Ps(V_s)(nozzle\ area)(sampling\ time)(1-Bws)}\right)$ = 100.9 %

where Ts:	681.2	°A
Vm(Std):	46.697	dscf
Ps:	27.332	"Hg
Vs	47.98	ft/sec
Nozzle Area:	0.000392	sq. ft.
Sampling Time:	60	min.
Bws:	0.0343	

EPA Method 23:
Ex. Run 1, 2,3,7,8-TCDD

19) TEF Adjusted Result = TEF value* lab result pg = 63.6 pg

where TEF:	1.0000	
Run 1 result:	63.60	pg

20) ng = result pg * 0.001 = 0.06 ng

where pg:	63.6000	pg

21) O_2 corrected ng = ng*(20.9-O2 correction)/(20.9-Run O2) = 0.46 ng

where ng:	6.36E-02	ng
O_2 Correction:	7.0	%
Run 1 O_2:	18.99	%

22) ng/dscm = O_2 corrected ng/sample volume = 0.35 ng/dscm

where O_2 corrected ng:	4.63E-01	ng
Sample volume:	1.322	dscm

Field Moisture Log

Client: Tucson Iron + Metals
Source: Contraband Incinerator
Project #: TIM220419
Location: Tucson, Az
Date(s): 11/24/2020

Run # 1	Method: 23			Filter #: 1	
Impingers (g)				Silica Gel	Total Gain
Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**		
Initial: 361	Initial: 710.7	Initial: 737.2	Initial: 649.3		
Final: 389	Final: 710.4	Final: 737.6	Final: 650.4		
Gain: 28	Gain: -0.3	Gain: 0.4	Gain: 1.1	Initial: 875.7	Impingers: 29.2
				Final: 881.7	Silica Gel: 6
Impinger 5	**Impinger 6**	**Impinger 7**	**Impinger 8**	Gain: 6	Total Gain: 35.2
Initial:	Initial:	Initial:	Initial:		
Final:	Final:	Final:	Final:		
Gain:	Gain:	Gain:	Gain:		

Run # 2	Method: 23			Filter #: 2	
Impingers (g)				Silica Gel	Total Gain
Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**		
Initial: 367	Initial: 715.6	Initial: 734	Initial: 595.7		
Final: 380.3	Final: 714.9	Final: 734.7	Final: 596.6		
Gain: 13.3	Gain: -0.7	Gain: 0.7	Gain: 0.9	Initial: 984.3	Impingers: 14.2
				Final: 998.2	Silica Gel: 13.9
Impinger 5	**Impinger 6**	**Impinger 7**	**Impinger 8**	Gain: 13.9	Total Gain: 28.1
Initial:	Initial:	Initial:	Initial:		
Final:	Final:	Final:	Final:		
Gain:	Gain:	Gain:	Gain:		

Run # 3	Method: 23			Filter #: 3	
Impingers (g)				Silica Gel	Total Gain
Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**		
Initial: 389	Initial: 710.4	Initial: 737.6	Initial: 650.4		
Final: 400.1	Final: 708.1	Final: 737.1	Final: 650.8		
Gain: 11.1	Gain: -2.3	Gain: -0.5	Gain: 0.4	Initial: 881.7	Impingers: 8.7
				Final: 891.1	Silica Gel: 9.4
Impinger 5	**Impinger 6**	**Impinger 7**	**Impinger 8**	Gain: 9.4	Total Gain: 18.1
Initial:	Initial:	Initial:	Initial:		
Final:	Final:	Final:	Final:		
Gain:	Gain:	Gain:	Gain:		

BISON ENGINEERING GASEOUS TESTING SUMMARY

Company	**Tucson Iron and Metals**	Source	**Contraband Incinerator**
Facility	**Contraband Incinerator**	Date	**November 24, 2020**
Location	**Tucson, AZ**		
Environmental Conditions	Sunny, 60-80 degrees F.		

Run	1	2	3	
Date	11/24/2020	11/24/2020	11/24/2020	
Run Start Time	9:05	10:59	12:54	
Run End Time	10:18	12:20	14:00	
Stack Diameter, in.	44.00	44.00	44.00	
Stack Area, sq.ft.	10.559	10.559	10.559	Average
Barometric Pressure, "Hg	27.31	27.31	27.31	27.31
Static Press., "H_2O	0.30	0.30	0.30	0.30
Stack Temperature, °F	221	241	254	239
CO_2 %vd	1.65	1.81	1.90	1.79
O_2 %vd	18.99	18.85	18.75	18.86

Bison Engineering, Inc.
Method 3A Oxygen
Calibration Error, System Bias and System Drift

Company:	Tucson Iron and Metals	Source	Contraband Incinerator	Instrument Make:	Servomex
Facility:	Contraband Incinerator	Date	November 24, 2020	Instrument Model:	1440
Location:	Tucson, AZ			Instrument Serial #:	14202/3280

			Initial Values			Final Values								
		Analyzer Cal. Response	System Cal Response	Pre test System Cal. Bias % of span	pass/fail	System Cal Response	Post test System Cal. Bias % of span	pass/fail	System Drift % of span	pass/fail	Analyzer Span	Raw Avg Gas Conc	Corrected Gas Conc	Instrument Cal. Reference Gas
Run 1	zero	-0.01	0.38	1.95	pass	0.18	0.95	pass	1.00	pass				
	upscale	10.09	10.22	0.65	pass	9.93	-0.80	pass	1.45	pass	19.96	18.84	18.99	10.02
Run 2	zero	-0.01	0.38	1.95	pass	0.18	0.95	pass	1.00	pass				
	upscale	10.09	10.22	0.65	pass	9.93	-0.80	pass	1.45	pass	19.96	18.71	18.85	10.02
Run 3	zero	-0.01	0.38	1.95	pass	0.18	0.95	pass	1.00	pass				
	upscale	10.09	10.22	0.65	pass	9.93	-0.80	pass	1.45	pass	19.96	18.61	18.75	10.02
				< 5%*			< 5%*		< 3%*					

ANALYZER CAL. ERROR	Zero	Mid	High
Calibration gas standards	0	10.02	19.96
Cal gas analyzer response	-0.01	10.09	20
Analyzer Cal. Error	-0.05	0.35	0.20
Analyzer Cal. Error < 2%*	pass	pass	pass

Note: All units are in %
***Or < 0.5 % absolute difference**

Bison Engineering, Inc.
Method 3A CO2
Calibration Error, System Bias and System Drift

Company:	Tucson Iron and Metals	Source	Contraband Incinerator	Instrument Make:	Servomex
Facility:	Contraband Incinerator	Date	November 24, 2020	Instrument Model:	1440
Location:	Tucson, AZ			Instrument Serial #:	14202/3280

			Initial Values			Final Values								
		Analyzer Cal. Response	System Cal Response	Pre test System Cal. Bias % of span	pass/fail	System Cal Response	Post test System Cal. Bias % of span	pass/fail	System Drift % of span	pass/fail	Analyzer Span	Raw Avg Gas Conc	Corrected Gas Conc	Instrument Cal. Reference Gas
Run 1	zero	-0.01	0.00	0.05	pass	0.01	0.10	pass	0.05	pass				
	upscale	10.13	9.90	-1.16	pass	9.97	-0.81	pass	0.35	pass	19.86	1.65	1.65	9.96
Run 2	zero	-0.01	0.00	0.05	pass	0.01	0.10	pass	0.05	pass				
	upscale	10.13	9.90	-1.16	pass	9.97	-0.81	pass	0.35	pass	19.86	1.81	1.81	9.96
Run 3	zero	-0.01	0.00	0.05	pass	0.01	0.10	pass	0.05	pass				
	upscale	10.13	9.90	-1.16	pass	9.97	-0.81	pass	0.35	pass	19.86	1.90	1.90	9.96
				< 5%*			< 5%*		< 3%*					

ANALYZER CAL. ERROR	Zero	Mid	High
Calibration gas standards	0	9.96	19.86
Cal gas analyzer response	-0.01	10.13	19.88
Analyzer Cal. Error	-0.05	0.86	0.10
Analyzer Cal. Error < 2%*	pass	pass	pass

Note: All units are in %
***Or < 0.5 % absolute difference**

Stratification Check

Company Tucson Iron and Metals

Location Tucson, AZ **Date** 11/24/2020

Source Contraband Incinerator **Stack Dimensions** 44 inches
Port Depth 4.0 inches

3 POINT METHOD

% of diameter		Pt location	O2%	Diff (+/- 5%)	Pass/Fail
16.7%	1	11.35	18.89	0.53%	PASS
50.0%	2	26.00	18.84	0.27%	PASS
83.3%	3	40.65	18.64	-0.80%	PASS
		AVERAGE:	18.79		

EPA Method 3A,
Example Calculations

Client:	**Tucson Iron and Metals**	**Run:**	**1**
Location:	**Tucson, AZ**	**Start Time:**	**9:05**
Source:	**Contraband Incinerator**	**End Time:**	**10:18**
Method:	**3A**	**Date:**	**11/24/2020**

EPA Method 3A (O_2):

Analyzer Calibration Error (Mid)

1) $ACE = \left(\frac{C_{Dir} - CV}{CS}\right) \times 100 =$ 0.35 %v

where C_{Dir}: 10.09 %
C_V: 10.02 %
CS: 19.96 %

System Bias (Upscale)

2) $SB = \left(\frac{C_S - CDir}{CS}\right) \times 100 =$ 0.65 %v

where C_{Dir}: 10.09 %
C_S: 10.22 %
CS: 19.96 %

Drift Assessment (Upscale)

3) $D = | SB_{Final} - SB_i | =$ 1.45 %v

where SB_{Final}: -0.80 %
SB_i: 0.65 %

Effluent Gas Concentration

4) $C_{Gas} = (C_{Avg} - C_O) \left(\frac{C_{MA}}{C_M - CO}\right) =$ 18.99 %v

where C_{Avg}: 18.84 %
C_O: 0.28 %
C_{MA}: 10.02 %
C_M: 10.08 %

EPA Method 3A,
Example Calculations

Client:	**Tucson Iron and Metals**	**Run:**	**1**
Location:	**Tucson, AZ**	**Start Time:**	**9:05**
Source:	**Contraband Incinerator**	**End Time:**	**10:18**
Method:	**3A**	**Date:**	**11/24/2020**

EPA Method 3A (CO_2):

Analyzer Calibration Error (Mid)

1) $ACE = \left(\frac{C_{Dir} - CV}{CS}\right) \times 100 =$ 0.86 %v

where C_{Dir}: 10.13 %
C_V: 9.96 %
CS: 19.86 %

System Bias (Upscale)

2) $SB = \left(\frac{C_S - CDir}{CS}\right) \times 100 =$ -1.16 %v

where C_{Dir}: 10.13 %
C_S: 9.90 %
CS: 19.86 %

Drift Assessment (Upscale)

3) $D = | SB_{Final} - SB_i | =$ 0.35 %v

where SB_{Final}: -0.81 %
SB_i: -1.16 %

Effluent Gas Concentration

4) $C_{Gas} = (C_{Avg} - C_O) \left(\frac{C_{MA}}{C_M - CO}\right) =$ 1.65 %v

where C_{Avg}: 1.65 %
C_O: 0.01 %
C_{MA}: 9.96 %
C_M: 9.94 %

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	6:36:00	-0.01	-0.01	**Analyzer Zero**
11/24/2020	6:37:00	12.22	12.99	
11/24/2020	6:38:00	19.91	18.95	
11/24/2020	6:39:00	19.99	19.72	
11/24/2020	6:40:00	19.99	19.87	
11/24/2020	6:41:00	20.00	19.88	**O2/CO2 Analyzer Span**
11/24/2020	6:42:00	17.74	16.36	
11/24/2020	6:43:00	10.14	10.15	
11/24/2020	6:44:00	10.09	10.13	**O2/CO2 Analyzer Mid**
11/24/2020	6:45:00	11.74	7.66	
11/24/2020	6:46:00	13.72	0.12	
11/24/2020	6:47:00	0.67	0.03	
11/24/2020	6:48:00	0.54	0.03	
11/24/2020	6:49:00	0.42	0.02	
11/24/2020	6:50:00	0.40	0.02	
11/24/2020	6:51:00	0.39	0.02	
11/24/2020	6:52:00	0.36	0.01	
11/24/2020	6:53:00	0.35	0.01	
11/24/2020	6:54:00	0.34	0.01	
11/24/2020	6:55:00	0.36	0.01	
11/24/2020	6:56:00	6.74	0.03	
11/24/2020	6:57:00	20.77	0.08	
11/24/2020	6:58:00	20.87	0.11	
11/24/2020	6:59:00	20.89	0.10	
11/24/2020	7:00:00	20.85	0.07	
11/24/2020	7:01:00	2.12	0.02	
11/24/2020	7:02:00	4.98	0.03	
11/24/2020	7:03:00	20.80	0.06	
11/24/2020	7:04:00	20.93	0.07	
11/24/2020	7:05:00	20.95	0.06	
11/24/2020	7:06:00	20.90	0.08	
11/24/2020	7:07:00	20.71	0.07	
11/24/2020	7:08:00	20.97	0.06	
11/24/2020	7:09:00	20.98	0.06	
11/24/2020	7:10:00	20.98	0.05	
11/24/2020	7:11:00	20.98	0.06	
11/24/2020	7:12:00	20.98	0.05	
11/24/2020	7:13:00	20.99	0.05	
11/24/2020	7:14:00	21.00	0.05	

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes	
11/24/2020	7:15:00	21.00	0.05		
11/24/2020	7:16:00	21.00	0.05		
11/24/2020	7:17:00	21.00	0.05		
11/24/2020	7:18:00	21.00	0.05		
11/24/2020	7:19:00	21.00	0.05		
11/24/2020	7:20:00	21.00	0.04		
11/24/2020	7:21:00	21.01	0.05		
11/24/2020	7:22:00	21.01	0.05		
11/24/2020	7:23:00	21.00	0.05		
11/24/2020	7:24:00	21.01	0.04		
11/24/2020	7:25:00	21.00	0.05		
11/24/2020	7:26:00	21.00	0.05		
11/24/2020	7:27:00	21.00	0.04		
11/24/2020	7:28:00	21.01	0.05		
11/24/2020	7:29:00	21.00	0.05		
11/24/2020	7:30:00	21.01	0.05		
11/24/2020	7:31:00	21.01	0.05		
11/24/2020	7:32:00	21.01	0.05		
11/24/2020	7:33:00	21.01	0.05		
11/24/2020	7:34:00	21.00	0.06		
11/24/2020	7:35:00	21.01	0.05		
11/24/2020	7:36:00	21.01	0.06		
11/24/2020	7:37:00	21.01	0.05		
11/24/2020	7:38:00	20.54	0.05		
11/24/2020	7:39:00	1.36	0.01		
11/24/2020	7:40:00	0.42	0.00		
11/24/2020	7:41:00	0.38	0.00	**System Zero**	
11/24/2020	7:42:00	7.32	6.42		
11/24/2020	7:43:00	10.21	9.87		
11/24/2020	7:44:00	10.22	9.90	**O2/CO2 System Upscale Client Downtime**	
11/24/2020	9:05:00	18.71	1.73	**Start Run 1**	
11/24/2020	9:06:00	18.78	1.69		
11/24/2020	9:07:00	18.80	1.67		
11/24/2020	9:08:00	18.83	1.64		
11/24/2020	9:09:00	19.04	1.46		
11/24/2020	9:10:00	18.90	1.58	**Stratification Check**	
11/24/2020	9:11:00	18.92	1.57	**S1**	18.89
11/24/2020	9:12:00	18.84	1.64		

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes	
11/24/2020	9:13:00	18.86	1.62		
11/24/2020	9:14:00	18.78	1.71		
11/24/2020	9:15:00	18.82	1.65	**S2**	18.84
11/24/2020	9:16:00	18.79	1.71		
11/24/2020	9:17:00	18.92	1.54		
11/24/2020	9:18:00	18.88	1.59		
11/24/2020	9:19:00	18.92	1.57		
11/24/2020	9:20:00	18.67	1.81	**S3**	18.64
11/24/2020	9:21:00	18.70	1.77		
11/24/2020	9:22:00	18.54	1.93		
11/24/2020	9:23:00	18.59	1.83		
11/24/2020	9:24:00	18.86	1.61		
11/24/2020	9:25:00	18.99	1.45		
11/24/2020	9:26:00	19.17	1.36		
11/24/2020	9:27:00	18.91	1.58		
11/24/2020	9:28:00	19.11	1.37		
11/24/2020	9:29:00	19.13	1.38		
11/24/2020	9:30:00	18.87	1.64		
11/24/2020	9:31:00	18.81	1.66		
11/24/2020	9:32:00	18.92	1.55		
11/24/2020	9:33:00	18.98	1.51		
11/24/2020	9:34:00	19.02	1.48		
11/24/2020	9:35:00	18.79	1.71		
11/24/2020	9:36:00	18.83	1.62		
11/24/2020	9:37:00	18.85	1.66		
11/24/2020	9:38:00	18.73	1.72		
11/24/2020	9:39:00	18.92	1.56		
11/24/2020	9:40:00	19.05	1.41		
11/24/2020	9:41:00	19.21	1.31		
11/24/2020	9:42:00	18.86	1.60		
11/24/2020	9:43:00	19.02	1.47		
11/24/2020	9:44:00	18.67	1.81		
11/24/2020	9:45:00	18.55	1.87		
11/24/2020	9:46:00	18.61	1.82		
11/24/2020	9:47:00	18.65	1.74		
11/24/2020	9:48:00	18.79	1.64		
11/24/2020	9:49:00	18.96	1.47		
11/24/2020	9:50:00	19.11	1.36		
11/24/2020	9:51:00	18.83	1.66		

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	9:52:00	18.68	1.76	
11/24/2020	9:53:00	18.59	1.85	
11/24/2020	9:54:00	18.55	1.86	
11/24/2020	9:55:00	18.64	1.79	
11/24/2020	9:56:00	18.69	1.76	
11/24/2020	9:57:00	18.71	1.74	
11/24/2020	9:58:00	18.81	1.67	
11/24/2020	9:59:00	19.05	1.49	
11/24/2020	10:00:00	18.83	1.68	
11/24/2020	10:01:00	18.85	1.67	
11/24/2020	10:02:00	18.87	1.63	
11/24/2020	10:03:00	18.89	1.62	
11/24/2020	10:04:00	18.78	1.73	
11/24/2020	10:05:00	18.95	1.54	
11/24/2020	10:06:00	19.21	1.36	
11/24/2020	10:07:00	19.28	1.31	
11/24/2020	10:08:00	19.00	1.61	
11/24/2020	10:09:00	18.73	1.82	
11/24/2020	10:10:00	18.63	1.93	
11/24/2020	10:11:00	18.74	1.80	
11/24/2020	10:12:00	18.89	1.64	
11/24/2020	10:13:00	18.99	1.61	
11/24/2020	10:14:00	18.57	1.97	
11/24/2020	10:15:00	18.65	1.86	
11/24/2020	10:16:00	18.85	1.69	
11/24/2020	10:17:00	18.76	1.79	
11/24/2020	10:18:00	18.63	1.90	**End Run 1**
		18.84	**1.65**	**Averages**
				Recovering Run 1
11/24/2020	10:59:00	18.70	1.82	**Start Run 2**
11/24/2020	11:00:00	18.74	1.74	
11/24/2020	11:01:00	18.64	1.87	
11/24/2020	11:02:00	18.60	1.87	
11/24/2020	11:03:00	18.79	1.71	
11/24/2020	11:04:00	18.85	1.71	
11/24/2020	11:05:00	18.66	1.86	
11/24/2020	11:06:00	18.66	1.87	

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	11:07:00	18.53	1.96	
11/24/2020	11:08:00	18.63	1.88	
11/24/2020	11:09:00	18.54	1.94	
11/24/2020	11:10:00	18.60	1.90	
11/24/2020	11:11:00	18.43	2.05	
11/24/2020	11:12:00	18.51	1.96	
11/24/2020	11:13:00	18.62	1.90	
11/24/2020	11:14:00	18.51	2.00	
11/24/2020	11:15:00	18.47	2.05	
11/24/2020	11:16:00	18.26	2.25	
11/24/2020	11:17:00	18.33	2.21	
11/24/2020	11:18:00	18.39	2.15	
11/24/2020	11:19:00	18.43	2.08	
11/24/2020	11:20:00	18.58	1.90	
11/24/2020	11:21:00	18.79	1.71	
11/24/2020	11:22:00	18.84	1.71	
11/24/2020	11:23:00	18.61	1.89	
11/24/2020	11:24:00	18.71	1.82	
11/24/2020	11:25:00	18.56	1.93	
11/24/2020	11:26:00	18.69	1.84	
11/24/2020	11:27:00	18.60	1.89	
11/24/2020	11:28:00	18.72	1.80	
11/24/2020	11:29:00	18.81	1.71	
11/24/2020	11:30:00	18.60	1.92	
11/24/2020	11:31:00	18.54	1.94	
11/24/2020	11:32:00	18.50	1.98	
11/24/2020	11:33:00	18.71	1.79	
11/24/2020	11:34:00	18.56	1.96	
11/24/2020	11:35:00	18.54	1.93	
11/24/2020	11:36:00	18.65	1.86	
11/24/2020	11:37:00	18.85	1.64	
11/24/2020	11:38:00	18.94	1.63	
11/24/2020	11:39:00	18.82	1.68	
11/24/2020	11:40:00	18.75	1.80	
11/24/2020	11:41:00	18.78	1.72	
11/24/2020	11:42:00	18.62	1.91	
11/24/2020	11:43:00	18.70	1.79	
11/24/2020	11:44:00	18.70	1.81	
11/24/2020	11:45:00	18.64	1.89	

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	11:46:00	18.47	2.01	
11/24/2020	11:47:00	18.72	1.80	
11/24/2020	11:48:00	18.51	1.99	
11/24/2020	11:49:00	18.46	2.03	
11/24/2020	11:50:00	18.42	2.06	
11/24/2020	11:51:00	18.48	2.00	
11/24/2020	11:52:00	18.49	2.02	
11/24/2020	11:53:00	18.49	2.00	
11/24/2020	11:54:00	18.52	1.98	
11/24/2020	11:55:00	18.50	1.99	
11/24/2020	11:56:00	18.58	1.93	
11/24/2020	11:57:00	18.68	1.83	
11/24/2020	11:58:00	18.77	1.75	
11/24/2020	11:59:00	18.94	1.60	
11/24/2020	12:00:00	18.91	1.63	
11/24/2020	12:01:00	18.85	1.70	
11/24/2020	12:02:00	18.82	1.71	
11/24/2020	12:03:00	18.85	1.71	
11/24/2020	12:04:00	18.80	1.71	
11/24/2020	12:05:00	18.95	1.60	
11/24/2020	12:06:00	18.94	1.60	
11/24/2020	12:07:00	19.17	1.38	
11/24/2020	12:08:00	19.23	1.36	
11/24/2020	12:09:00	19.18	1.42	
11/24/2020	12:10:00	19.02	1.56	
11/24/2020	12:11:00	19.06	1.51	
11/24/2020	12:12:00	19.04	1.54	
11/24/2020	12:13:00	18.94	1.63	
11/24/2020	12:14:00	18.98	1.57	
11/24/2020	12:15:00	19.10	1.46	
11/24/2020	12:16:00	19.08	1.50	
11/24/2020	12:17:00	19.00	1.57	
11/24/2020	12:18:00	18.98	1.59	
11/24/2020	12:19:00	18.98	1.61	
11/24/2020	12:20:00	18.88	1.66	**End Run 2**
		18.71	**1.81**	**Averages**
				Recovering Run 2

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	12:54:00	18.66	1.85	**Start Run 3**
11/24/2020	12:55:00	18.69	1.81	
11/24/2020	12:56:00	18.94	1.62	
11/24/2020	12:57:00	18.60	1.91	
11/24/2020	12:58:00	18.55	1.93	
11/24/2020	12:59:00	18.79	1.71	
11/24/2020	13:00:00	18.54	1.96	
11/24/2020	13:01:00	18.59	1.89	
11/24/2020	13:02:00	18.51	1.97	
11/24/2020	13:03:00	18.59	1.89	
11/24/2020	13:04:00	18.50	1.98	
11/24/2020	13:05:00	18.60	1.89	
11/24/2020	13:06:00	18.62	1.86	
11/24/2020	13:07:00	18.75	1.77	
11/24/2020	13:08:00	18.60	1.90	
11/24/2020	13:09:00	18.64	1.86	
11/24/2020	13:10:00	18.64	1.86	
11/24/2020	13:11:00	18.58	1.92	
11/24/2020	13:12:00	18.42	2.05	
11/24/2020	13:13:00	18.49	1.97	
11/24/2020	13:14:00	18.52	1.97	
11/24/2020	13:15:00	18.51	1.99	
11/24/2020	13:16:00	18.60	1.89	
11/24/2020	13:17:00	18.56	1.98	
11/24/2020	13:18:00	18.54	1.98	
11/24/2020	13:19:00	18.53	1.97	
11/24/2020	13:20:00	18.64	1.88	
11/24/2020	13:21:00	18.80	1.72	
11/24/2020	13:22:00	18.57	1.98	
11/24/2020	13:23:00	18.53	1.98	
11/24/2020	13:24:00	18.54	1.99	
11/24/2020	13:25:00	18.69	1.83	
11/24/2020	13:26:00	18.70	1.82	
11/24/2020	13:27:00	18.80	1.75	
11/24/2020	13:28:00	18.60	1.91	
11/24/2020	13:29:00	18.70	1.85	
11/24/2020	13:30:00	18.52	2.00	
11/24/2020	13:31:00	18.70	1.83	
11/24/2020	13:32:00	18.56	1.97	

Tucson Iron and Metals
Contraband Incinerator
Calibration and Run Data

Date	Time	O2 (Outlet) [%]	CO2 [%]	Notes
11/24/2020	13:33:00	18.65	1.87	
11/24/2020	13:34:00	18.58	1.93	
11/24/2020	13:35:00	18.65	1.88	
11/24/2020	13:36:00	18.60	1.93	
11/24/2020	13:37:00	18.72	1.78	
11/24/2020	13:38:00	18.69	1.84	
11/24/2020	13:39:00	18.68	1.83	
11/24/2020	13:40:00	18.65	1.88	
11/24/2020	13:41:00	18.57	1.94	
11/24/2020	13:42:00	18.58	1.91	
11/24/2020	13:43:00	18.73	1.82	
11/24/2020	13:44:00	18.61	1.89	
11/24/2020	13:45:00	18.77	1.78	
11/24/2020	13:46:00	18.67	1.84	
11/24/2020	13:47:00	18.61	1.94	
11/24/2020	13:48:00	18.49	2.01	
11/24/2020	13:49:00	18.49	2.02	
11/24/2020	13:50:00	18.57	1.96	
11/24/2020	13:51:00	18.51	2.00	
11/24/2020	13:52:00	18.67	1.84	
11/24/2020	13:53:00	18.60	1.95	
11/24/2020	13:54:00	18.67	1.84	
11/24/2020	13:55:00	18.50	2.02	
11/24/2020	13:56:00	18.56	1.94	
11/24/2020	13:57:00	18.53	2.02	
11/24/2020	13:58:00	18.58	1.95	
11/24/2020	13:59:00	18.63	1.90	
11/24/2020	14:00:00	18.73	1.81	**End Run 3**
		18.61	**1.90**	**Averages**
				Recovering Run 3
11/24/2020	14:39:00	0.18	0.01	**System Zero**
11/24/2020	14:40:00	4.43	3.61	
11/24/2020	14:41:00	9.93	9.97	**O2/CO2 Upscale**
11/24/2020	14:42:00	9.98	10.05	
11/24/2020	14:43:00	13.90	5.48	
11/24/2020	14:44:00	20.81	0.19	
11/24/2020	14:45:00	20.91	0.10	

APPENDIX C: LABORATORY REPORTS

ED_005878_00000192-00048

December 15, 2020 Service Request No:E2001165

Conner Everly
Bison Engineering, Incorporated
4251 S Station Master Dr
Tucson, AZ 85715

Laboratory Results for: Tucson Iron & Metals

Dear Adam,

Enclosed are the results of the sample(s) submitted to our laboratory November 25, 2020
For your reference, these analyses have been assigned our service request number **E2001165.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety, and ALS Environmental is not responsible for use of less than the final complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the TNI 2009 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Corey Grandits
Project Manager

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099
PHONE +1 281 530 5656 | FAX +1 281 530 5887
ALS Group USA, Corp.
dba ALS Environmental

Certificate of Analysis

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Environmental

Client:	Bison Eng	**Service Request No.:**	E2001165
Project:	Tuscon Iron & Metals	**Date Received:**	11/25/20
Sample Matrix:	Air		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four samples were received for analysis at ALS Environmental in Houston on 11/25/20.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2000642: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in lieu of a MS/MSD for this extraction batch. 2,3,7,8-TCDD was recovered marginally above QC limits (131%) in the LCS; DLCS recovery passes. 2,3,4,7,8-PeCDFwas recovered marginally above QC limits (131%) in the DLCS; LCS recovery passes. 1,2,3,7,8,9-HxCDF & 1,2,3,4,7,8,9-HpCDF recoveries in both the LCS/ DLCS were above QC limits; these two compounds should be considered poentially biad high for the samples in the batch.

B flags – Method Blanks

The Method Blank EQ2000642-01 contained low levels of target compounds above the EDL however below the Method Reporting Limit (MRL). The associated compounds in the samples are flagged with 'B' flags where the sample result is less than ten times the level detected in the method blank.

Y flags – Labeled Standards

Quantification of the native 2,3,7,8-substituted congeners is based on isotopic dilution, which automatically corrects for variation in extraction efficiency and provides accurate values even with poor recovery. Samples that had recoveries of labeled standards outside the acceptance limits are qualified with 'Y' flags on the Labeled Compound summary pages. In all cases, the signal-to-noise ratios are greater than 10:1 and detection limits were below the Method Reporting Limits.

K flags

EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'K' flag. A 'K' flag indicates an estimated maximum possible concentration for the associated compound.

2378-TCDF

Samples analyzed on the DB-5MSUI column were analyzed under conditions where sufficient separation between 2,3,7,8-TCDF and its closest eluter was achieved. Confirmation of this result was not required.

Detection Limits

Detection limits are calculated for each analyte in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The TEQ Summary results for each sample have been calculated by ALS/Houston to include:

- WHO-2005 TEFs, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds (M. Van den Berg et al., Toxicological Sciences 93(2):223-241, 2006)
- 2378-TCDF from the DB-225 column, when confirmation required
- Non-detected compounds are not included in the 'Total'

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Bison Engineering, Incorporated **Service Request:**E2001165
Project: Tucson Iron & Metals/TIM220419

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E2001165-001	TIM220419 M23 R1 903-36-003	11/24/2020	1030
E2001165-002	TIM220419 M23 R2 903-36-002	11/24/2020	1230
E2001165-003	TIM220419 M23 R3 903-36-004	11/24/2020	1420
E2001165-004	TIM220419 M23 Blank 903-36-001	11/24/2020	0900

Service Request Summary

Folder #: **E2001165**
Client Name: Bison Engineering, Incorporated
Project Name: Tucson Iron & Metals
Project Number: TIM220419

Project Chemist: Corey Grandits
Originating Lab: HOUSTON
Logged By: CGRANDITS
Date Received: 11/25/20
Internal Due Date: 12/9/2020
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: No EDD Specified

16 -N/A N/A
Location: EHRMS-WIC 7E
Pressure Gas:
Rush

Lab Samp No.	Client Samp No	Matrix	Collected	HOUSTON PCDD PCDF/23
E2001165-001	TIM220419 M23 R1 903-36-003	Air	11/24/20 1030	II
E2001165-002	TIM220419 M23 R2 903-36-002	Air	11/24/20 1230	II
E2001165-003	TIM220419 M23 R3 903-36-004	Air	11/24/20 1420	II
E2001165-004	TIM220419 M23 Blank 903-36-001	Air	11/24/20 0900	II

Service Request Summary

Folder #:	**E2001165**	Project Chemist:	Corey Grandits	16 -N/A N/A	
Client Name:	Bison Engineering, Incorporated	Originating Lab:	HOUSTON	**Location:**	EHRMS-WIC 7E
Project Name:	Tucson Iron & Metals	Logged By:	CGRANDITS	**Pressure Gas:**	
Project Number:	TIM220419	Date Received:	11/25/20	**Rush**	
		Internal Due Date:	12/9/2020		
		QAP:	LAB QAP		
		Qualifier Set:	Lab Standard		
		Formset:	Lab Standard		
		Merged?:	Y		
		Report to MDL?:	Y		
		P.O. Number:			
		EDD:	No EDD Specified		

Data Qualifiers

Lab Standard

+	Possible Tedlar bag artifact.
A	TIC is a suspected aldol-condensation product
B	Analyte found in the associated method blank as well as in the sample.
BC	Reported results are not blank corrected.
BH	The back section of the tube yielded higher results than the front.
BT	Results indicated possible breakthrough; back section >=10% front section.
C	Result identification confirmed.
D	Compound identified in an analysis at a secondary dilution factor
D	Spike was diluted out
DE	Reported results are corrected for desorption efficiency.
E	Estimated value. Concentration above calibration range
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
H1	Sample analysis performed past holding time. See case narrative.
H2	Initial analysis within holding time. Reanalysis for the required dilution was past holding time.
H3	Sample was received and analyzed past holding time.
H4	Sample was extracted past required extraction holding time, but analyzed within analysis holding time. See case narrative.
I	Internal standard not within the specified limits. See case narrative.
J	Estimated Value. Concentration found below MRL.
K	A deflection in the QC ion may indicate interference with the quantitation of this ion. The concentration of this analyte should be considered as an estimate.
K	Analyte was detected above the method reporting limit prior to normalization.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
L1	Laboratory control sample recovery outside the specified limits; results may be biased high.
L2	Laboratory control sample recovery outside the specified limits; results may be biased low.
L3	Laboratory control sample recovery outside the specified limits.
M	Matrix interference; results may be biased high.
M	The duplicate injection precision not met.
M1	Matrix interference due to coelution with a non-target compound; results may be biased high.
N	Presumptive evidence of a compound for TICs that have been identified based on a mass spectral library search.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.

Data Qualifiers

Lab Standard

P	Indicates chlorodiphenyl ether interference present at the retention time of the target compound.
P	Pesticide/Aroclor target analyte > 40% difference for detected concentrations between GC columns
Q	Indicates as estimated value because the P and P + 2 theoretical abundance ratio does not meet method criteria.
R	Duplicate Precision not met.
R1	Duplicate precision not within the specified limits; however, the results are below the MRL and considered estimated.
S	Surrogate recovery not within specified limits.
S	The reported value was determined by the Method of Standard Additions (MSA).
T	Analyte is a tentatively identified compound, result is estimated.
U	Compound was analyzed for, but was not detected (ND).
V1	The continuing calibration verification standard was outside (biased high) the specified limits for this compound.
V2	The continuing calibration verification standard was outside (biased low) the specified limits for this compound.
W	Result quantified, but the corresponding peak was detected outside the generated retention time window.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
X	See case narrative.
Y	Recovery outside limits
Y	The chromatogram resembles a petroleum product but does not match the calibration standard.
Z	The chromatogram does not resemble a petroleum product.
i	The MRL/MDL has been elevated due to a matrix interference.

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

ED_005878_00000192-00058

ALS Environmental

State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
American Association for Laboratory Accreditation	2897.01 2020	11/30/2021
Arizona Department of Health Services	AZ0793-2020	5/27/2021
Arkansas Department of Environmental Quality	20-030-0	3/26/2021
California Department of Health Services	2919-2020	4/30/2021
Department of Defense	A2LA 2897.01	11/30/2021
Florida Department of Health	E87611-2020	6/30/2021
Hawaii Department of Health	2020	4/30/2021
Illinois Environmental Protection Agency	2000322020-4	5/9/2021
Kansas Department of Health and Environment	E-10352-2020	7/31/2021
Louisiana Department of Environmental Quality	03087-2020	6/30/2021
Louisiana Department of Health and Hospitals	LA028-2020	12/31/2020
Maine Department of Health and Human Services	2020016	6/5/2022
Maryland Department of the Environment	343-2020	6/30/2021
Michigan Depratment of Environmental Quality	9971-2020	4/30/2021
Minnesota Department of Health	1785988	12/31/2020
Nebraska Department of Health and Human Services	NE-OS-25-13 (2020)	4/30/2021
Nevada Department of Concervation and Natural Resources	TX026932021-1	7/31/2021
New Hampshire Environmental Laboratory Accreditation Program	209420	4/24/2021
New Jersey Department of Environmental Protection	TX008	6/30/2021
New York Department of Health	11707	3/31/2021
Oklahoma Department of Environmental Quality	2020-123	8/31/2021
Pennsylvania Department of Environmental Protection	014	6/30/2021
Tennessee Department of Environment and Concervation	04016-2020	4/30/2021
Texas Commision on Environmental Quality	T104704231-20-26	4/30/2021
United States Department of Agriculture	P330-19-00299	10/10/2022

ALS ENVIRONMENTAL – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID: E200 1165 DB-5MSUI SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date: 12/14/20 Analyst: JC Samples: 001-004

Second Level - Data Review – to be filled by person doing peer review

Date: 12/15/20 Analyst: KW Samples: 001-004

HS-HRMSREVIEW R1.0

PEER REVIEW PAGE2015

Chain of Custody

ALS Environmental - Houston HRMS
10450 Stancliff Rd, Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070

Chain of Custody Form

Page ____ of ____

COC ID: 48466

Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Tucson Iron + Metals	A	Method 23 Dioxins/Furans
Work Order		Project Number	TIM220419	B	Method 23 Dioxins/Furans Blank
Company Name	Bison Engineering Inc.	Bill To Company	Bison Engineering Inc.	C	
Send Report To	Connor Everly	Invoice Attn	Kay Johnson	D	
Address	4251 S. Station Master Dr. Tucson, AZ 85715	Address	3143 E. Lyndale	E	
				F	
City/State/Zip	Tucson, AZ 85715	City/State/Zip	Helena, MT, 59601	G	
Phone	520·749·2167	Phone	406·442·5768	H	
Fax		Fax		I	
e-Mail Address	Ceverly@Bison-Eng.com	e-Mail Address	BisonAP@bison-eng.com	J	

E2001165 5
Bison Engineering, Incorporated
Tucson Iron & Metals

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	TIM220419 M23 R1 903-36-003	11/24/20	10:30 AM				✓										
2	TIM220419 M23 R2 903-36-002	11/24/20	12:30 PM				✓										
3	TIM220419 M23 R3 903-36-004	11/24/20	14:20				✓										
4	TIM220419 M23 Blank 903-36-001	11/24/20	9:00 AM					✓									
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Connor Everly [signature]

Shipment Method: Fed-EX

Turnaround Time in Business Days (BD): ☑ Other 7 days ☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
[signature]	11/24/20	16:00	—
Relinquished by: —	Date:	Time:	Received by (Laboratory): JM [signature] 11/25/2020 10:45
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp
Red	3.6°
	#31 Clear

QC Package: (Check One Box Below)
☐ Level II Std QC
☐ Level III Std QC/Raw Date
☐ Level IV SW846/CLP
☐ Other
☐ TRRP Checklist
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

TIM220419
2020 Tucson Iron and Metal Contrab and Incinerator Dioxin and Furan Compliance Retest
62

Copyright 2012 by ALS Environmental.

Chain of Custody

ALS Environmental - Tucson
ADDRESS 4208 S Santa Rita Ave, Tucson, AZ 85714
PHONE +1 520 573 1061
ALS Group USA, Corp.

REPORTING

Company Name:	Bison Engineering Inc.
Contact Name:	Connor Everly
Address:	4251 S. Station Master Drive
City, State ZIP:	Tucson, AZ, 85714
Email:	Ceverly@Bison-eng.com Phone:
CC Report to:	Mseverson@Bison-eng.com
Project Name:	Tucson Iron+Metals Incinerator
Project Number:	TIM220419
Sampler's Name:	Connor Everly

INVOICING

AP Contact:	Kay Johnson
Company:	Bison Engineering Inc.
Address:	3143 E. Lyndale Ave Helena, MT. 59601
Email:	BisonAP@bison-eng.com Phone: (406)-442-5768
PO Number:	TIM220419

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present		
Received Intact:	Yes	No	N/A	Wet Ice / Blue Ice
Cooler Custody Seals:	Yes	No	N/A	Total Containers:
Sample Custody Seals:	Yes	No	N/A	

REQUESTED ANALYSIS

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	Method 23 Dioxins/Furans	Comments
M23-Filter 1	Filter	11/24/20	10:30 AM		1	X	
M23-Filter 2	Filter	11/24/20	12:30 PM		1	X	
M23-Filter 3	Filter	11/24/20	14:20		1	X	
M23-Filter Blank	Filter	11/24/20	9:00 am		1	X	

TAT (circle)

same* next BD*
2BD* 3-4BD*
5BD* 6BD*
7
routine**
(approx.12)

*** Please call for availability. Rush charges will apply.**

****TAT depends on complexity of samples and analysis.**

RELINQUISHED BY

Print Name	Signature	Date/Time
Connor Everly	[signature]	11/24/20 /16:00

RECEIVED BY

Print Name	Signature	Date/Time
P. Grea	[signature]	11/25/2020 630:45

Chain of Custody

ALS Environmental - Tucson
ADDRESS 4208 S Santa Rita Ave, Tucson, AZ 85714
PHONE +1 520 573 1061
ALS Group USA, Corp.

REPORTING

Company Name:	Bison Engineering Inc.
Contact Name:	Connor Everly
Address:	4251 S. Station Master Drive
City, State ZIP:	Tucson, AZ, 85714
Email:	Ceverly@Bison-eng.com Phone: (520)526-3798
CC Report to:	MSeverson@Bison-eng.com
Project Name:	Tucson Iron + Metals incinerator
Project Number:	TIM220419
Sampler's Name:	Connor Everly

INVOICING

AP Contact:	Kay Johnson
Company:	Bison Engineering inc.
Address:	3143 E. Lyndale Ave Helena, MT, 59601
Email:	BisonAP@bison-eng.com Phone: (406)-442-5768
PO Number:	TIM220419

SAMPLE RECEIPT

Temperature (°C):		Temp Blank Present		
Received Intact:	Yes	No	N/A	Wet Ice / Blue Ice
Cooler Custody Seals:	Yes	No	N/A	Total Containers:
Sample Custody Seals:	Yes	No	N/A	

REQUESTED ANALYSIS

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	Method 23 Dioxins/Furans	Volume (ml)	Comments
M23-FH-Pt1-1	Acetone CH_2Cl_2	11/24/20	10:30 AM		1	X	100	
M23-FH-Pt2-1	Toluene	11/24/20	10:30 AM		1	X	75	
M23-FH-Pt1-2	Acetone CH_2Cl_2	11/24/20	12:30 PM		1	X	75	
M23-FH-Pt2-2	Toluene	11/24/20	12:30 PM		1	X	75	
M23-FH-Pt1-3	Acetone CH_2Cl_2	11/24/20	1420		1	X	75	
M23-FH-Pt2-3	Toluene	11/24/20	1420		1	X	75	
M23-FH-Pt1-Blank	Acetone CH_2Cl_2	11/24/20	9:00 AM		1	X	75	
M23-FH-Pt2-Blank	Toluene	11/24/20	9:00 AM		1	X	75	
						X		
						X		
						X		

TAT (circle)

same* next BD*
2BD* 3-4BD*
5BD* 6BD*
routine** (approx.12)

* Please call for availability. Rush charges will apply.

**TAT depends on complexity of samples and analysis.

RELINQUISHED BY

Print Name	Signature	Date/Time
Connor Everly	[signature]	11/24/20 16:00

RECEIVED BY

Print Name	Signature	Date/Time
J. [illegible]	J. [illegible]	11/25/20 10:45

Cooler Receipt Form

ALS Environmental

Project Chemist: CG

Client/Project: Bison

Thermometer ID: 1831

Date/Time Received: 11/25/20 Initials: JM Date/Time Logged in: 11/25/20 Initials: CG

1. Method of delivery: ○ US Mail ☑ Fed Ex ○ UPS ○ DHL ○ Courier ○ Client
2. Samples received in: ☑ Cooler ☑ Box ○ Envelope ○ Other
3. Were custody seals on coolers? ☑ Yes ○ No
   Were they intact? ☑ Yes ○ No ○ N/A
   Were they signed and dated? ☑ Yes ○ No ○ N/A
   If yes, how many and where?
4. Packing Material: ☑ Inserts ☑ Baggies ☑ Bubble Wrap ○ Gel Packs ☑ Wet Ice ○ Sleeves ○ Other
5. Foreign or Regulated Soil? ○ Yes ☒ No Location of Sampling:

Cooler Tracking Number	COC ID	Date Opened	Time Opened	Opened By	Temp. °C	Temp Blank?
MAD RED		11/25/20	1045	JM	3.6	☑
1880 1504 9692		11/25/20	1045	JM	AMB	☑
						☐
						☐

6. Were custody papers properly filled out (ink, signed, dated, etc)? ☑ Yes ○ No
7. Did all bottles arrive in good condition (not broken, no signs of leakage)? ☑ Yes ○ No
8. Were all sample labels complete (i.e., sample ID, analysis, preservation, etc)? ☑ Yes ○ No
9. Were appropriate bottles/containers and volumes received for the requested tests? ☑ Yes ○ No
10. Did sample labels and tags agree with custody documents? ☑ Yes ○ No

Notes, Discrepancies, & Resolutions:

Service request Label: E2001165 5
Bison Engineering, Incorporated
Tucson Iron & Metals

10450 Stancliff Rd., Suite 210
Houston, TX 77099
T: +1 713 266 1599
F: +1 713 266 1599
www.alsglobal.com

SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental - Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6°C.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10°C.
- ✓ Air samples are shipped and stored cold, at 0 to 6°C
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

Preparation Information Benchsheets

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

Preparation Information Benchsheet

Prep Run#: 370808 **Prep WorkFlow:** OrgExtDioxA(30) **Status:** Prepped
Team: Semivoa GCMS/TWOODS **Prep Method:** Method **Prep Date/Time:** 12/3/20 13:35

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	E2001147-001	3685/20-Blank	.01	23/PCDD PCDF			Air	0.5000Sample	425-95-002
2	E2001147-002	3585/20-RUN 1	.01	23/PCDD PCDF			Air	0.5000Sample	425-95-002
3	E2001149-001	Horno Reverbero	.01	23/PCDD PCDF			Air	0.5000Sample	
4	E2001165-001	TIM220419 M23 R1 903-36-003	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 004
5	E2001165-002	TIM220419 M23 R2 903-36-002	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 003
6	E2001165-003	TIM220419 M23 R3 903-36-004	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 002
7	E2001165-004	TIM220419 M23 Blank 903-36-001	.01	23/PCDD PCDF			Air	0.5000Sample	426 84 004
8	E2001167-001	2442 Horno Ther	.01	23/PCDD PCDF			Air	0.5000Sample	
9	E2001178-001	Run 1	.01	23/PCDD PCDF			Air	0.5000Sample	
10	E2001178-002	Run 2	.01	23/PCDD PCDF			Air	0.5000Sample	
11	E2001178-003	Run 3	.01	23/PCDD PCDF			Air	0.5000Sample	
12	E2001178-004	Blank	.01	23/PCDD PCDF			Air	0.5000Sample	
13	EQ2000642-01	MB		23/PCDD PCDF			Air	0.5000Sample	
14	EQ2000642-02	LCS		23/PCDD PCDF			Air	0.5000Sample	
15	EQ2000642-03	DLCS		23/PCDD PCDF			Air	0.5000Sample	

Spiking Solutions

Name: 23/TO-9A Alternate Working Solution Inventory ID 212398 Logbook Ref: tw 09/10/20 100ng/ml Expires On: 02/24/2021

E2001147-001	20.00µL	E2001147-002	20.00µL	E2001149-001	20.00µL	E2001165-001	20.00µL	E2001165-002	20.00µL	E2001165-003	20.00µL
E2001165-004	20.00µL	E2001167-001	20.00µL	E2001178-001	20.00µL	E2001178-002	20.00µL	E2001178-003	20.00µL	E2001178-004	20.00µL
EQ2000642-01	20.00µL	EQ2000642-02	20.00µL	EQ2000642-03	20.00µL						

Name: 23/TO-9A Surrogate Working Solution Inventory ID 212532 Logbook Ref: TW 09/16/20 100NG/ML Expires On: 02/24/2021

E2001147-001	40.00µL	E2001147-002	40.00µL	E2001149-001	40.00µL	E2001165-001	40.00µL	E2001165-002	40.00µL	E2001165-003	40.00µL
E2001165-004	40.00µL	E2001167-001	40.00µL	E2001178-001	40.00µL	E2001178-002	40.00µL	E2001178-003	40.00µL	E2001178-004	40.00µL
EQ2000642-01	40.00µL	EQ2000642-02	40.00µL	EQ2000642-03	40.00µL						

Name: 23/TO-9A Internal Working Solution Inventory ID 213364 Logbook Ref: 213364 tw 100-200ng/ml Expires On: 02/24/2021

E2001147-001	40.00µL	E2001147-002	40.00µL	E2001149-001	40.00µL	E2001165-001	40.00µL	E2001165-002	40.00µL	E2001165-003	40.00µL
E2001165-004	40.00µL	E2001167-001	40.00µL	E2001178-001	40.00µL	E2001178-002	40.00µL	E2001178-003	40.00µL	E2001178-004	40.00µL
EQ2000642-01	40.00µL	EQ2000642-02	40.00µL	EQ2000642-03	40.00µL						

Name: 1613B Matrix Working Standard Inventory ID 214187 Logbook Ref: tw 2-20ng/ml 214187 Expires On: 02/24/2021

Preparation Information Benchsheet

Prep Run#: 370808 **Prep WorkFlow:** OrgExtDioxA(30) **Status:** Prepped
Team: Semivoa GCMS/TWOODS **Prep Method:** Method **Prep Date/Time:** 12/3/20 13:35

E2001147-001	200.00µL	E2001147-002	200.00µL	E2001149-001	200.00µL	E2001165-001	200.00µL	E2001165-002	200.00µL	E2001165-003	200.00µL
E2001165-004	200.00µL	E2001167-001	200.00µL	E2001178-001	200.00µL	E2001178-002	200.00µL	E2001178-003	200.00µL	E2001178-004	200.00µL
EQ2000642-01	200.00µL	EQ2000642-02	200.00µL	EQ2000642-03	200.00µL						

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	12/3/20 13:35	Started:	12/8/20 10:00	Started:	12/8/20 12:00	Started:	12/10/20 13:00
Finished:	12/4/20 09:00	Finished:	12/8/20 11:00	Finished:	12/8/20 15:00	Finished:	12/10/20 16:00
By:	TWOODS	By:	TWOODS	By:	TWOODS	By:	TWOODS
Comments		Comments		Comments		Comments	

Comments: _____

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____ Extracts Examined

Received By: _____ Date: _____ Yes No

TIM220419

2020 Tucson Iron and Metal Contraband Incinerator Dioxin and Furan Compliance Retest

Analytical Results

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston, TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 10:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R1 903-36-003	**Units:**	pg
Lab Code:	E2001165-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 15:32
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623870	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	63.6**K**		18.5	18.5	0.59	1.001	1
1,2,3,7,8-PeCDD	197		9.08	50.0	1.75	1.000	1
1,2,3,4,7,8-HxCDD	131		4.66	50.0	1.18	0.998	1
1,2,3,6,7,8-HxCDD	172		3.91	50.0	1.34	1.000	1
1,2,3,7,8,9-HxCDD	136		4.05	50.0	1.19	1.006	1
1,2,3,4,6,7,8-HpCDD	396		11.7	50.0	1.10	1.000	1
OCDD	263**B**		9.95	100	0.91	1.000	1
2,3,7,8-TCDF	184**K**		22.8	22.8	0.46	1.001	1
1,2,3,7,8-PeCDF	685		48.3	50.0	1.47	1.001	1
2,3,4,7,8-PeCDF	1720		49.2	50.0	1.39	1.028	1
1,2,3,4,7,8-HxCDF	1390		53.0	53.0	1.23	0.998	1
1,2,3,6,7,8-HxCDF	1210		44.1	50.0	1.17	1.000	1
1,2,3,7,8,9-HxCDF	300		61.3	61.3	1.11	1.035	1
2,3,4,6,7,8-HxCDF	1230		51.6	51.6	1.30	1.014	1
1,2,3,4,6,7,8-HpCDF	2720		18.2	50.0	0.96	1.000	1
1,2,3,4,7,8,9-HpCDF	272		22.8	50.0	1.17	1.037	1
OCDF	526		20.2	100	0.89	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 10:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R1 903-36-003	**Units:**	pg
Lab Code:	E2001165-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 15:32
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623870	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	3860		18.5	18.5	0.75		1
Total Penta-Dioxins	3750		9.08	50.0	1.59		1
Total Hexa-Dioxins	2810		4.18	50.0	1.23		1
Total Hepta-Dioxins	892		11.7	50.0	0.94		1
Total Tetra-Furans	14400		22.8	22.8	0.80		1
Total Penta-Furans	19200		1.26	50.0			1
Total Hexa-Furans	11800		51.8	51.8	1.19		1
Total Hepta-Furans	4610		20.2	50.0	0.96		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 10:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R1 903-36-003	**Units:**	Percent
Lab Code:	E2001165-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 15:32
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623870	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	791.540	40		40-130	0.76	1.019
13C-1,2,3,7,8-PeCDD	2000	1177.093	59		40-130	1.67	1.177
13C-1,2,3,6,7,8-HxCDD	2000	1097.985	55		40-130	1.30	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	1009.915	50		25-130	1.05	1.065
13C-OCDD	4000	1422.934	36		25-130	0.88	1.140
13C-2,3,7,8-TCDF	2000	700.444	35	Y	40-130	0.80	0.993
13C-1,2,3,7,8-PeCDF	2000	1031.883	52		40-130	1.60	1.136
13C-1,2,3,6,7,8-HxCDF	2000	924.563	46		40-130	0.50	0.974
13C-1,2,3,4,6,7,8-HpCDF	2000	791.697	40		25-130	0.42	1.041
37Cl-2,3,7,8-TCDD	2000	1916.670	96		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1633.443	82		70-130	1.31	0.997
13C-2,3,4,7,8-PeCDF	2000	1903.166	95		70-130	1.53	1.027
13C-1,2,3,4,7,8-HxCDF	2000	1948.269	97		70-130	0.50	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1777.509	89		70-130	0.41	1.036
13C-1,2,3,7,8,9-HxCDF	2000	1016.953	51		40-130	0.49	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 10:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R1 903-36-003	**Units:**	pg
Lab Code:	E2001165-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23

Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**63.6**	18.5	18.5	1	1	63.6
1,2,3,7,8-PeCDD	**197**	9.08	50.0	1	1	197
1,2,3,4,7,8-HxCDD	**131**	4.66	50.0	1	0.1	13.1
1,2,3,6,7,8-HxCDD	**172**	3.91	50.0	1	0.1	17.2
1,2,3,7,8,9-HxCDD	**136**	4.05	50.0	1	0.1	13.6
1,2,3,4,6,7,8-HpCDD	**396**	11.7	50.0	1	0.01	3.96
OCDD	**263**	9.95	100	1	0.0003	0.0789
2,3,7,8-TCDF	**184**	22.8	22.8	1	0.1	18.4
1,2,3,7,8-PeCDF	**685**	48.3	50.0	1	0.03	20.6
2,3,4,7,8-PeCDF	**1720**	49.2	50.0	1	0.3	516
1,2,3,4,7,8-HxCDF	**1390**	53.0	53.0	1	0.1	139
1,2,3,6,7,8-HxCDF	**1210**	44.1	50.0	1	0.1	121
1,2,3,7,8,9-HxCDF	**300**	61.3	61.3	1	0.1	30.0
2,3,4,6,7,8-HxCDF	**1230**	51.6	51.6	1	0.1	123
1,2,3,4,6,7,8-HpCDF	**2720**	18.2	50.0	1	0.01	27.2
1,2,3,4,7,8,9-HpCDF	**272**	22.8	50.0	1	0.01	2.72
OCDF	**526**	20.2	100	1	0.0003	0.158
		Total TEQ				1310

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 12:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R2 903-36-002	**Units:**	pg
Lab Code:	E2001165-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 16:21
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623871	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	293		9.32	10.0	0.82	1.000	1
1,2,3,7,8-PeCDD	874		5.04	50.0	1.49	1.000	1
1,2,3,4,7,8-HxCDD	561		4.67	50.0	1.23	0.998	1
1,2,3,6,7,8-HxCDD	697		3.91	50.0	1.21	1.000	1
1,2,3,7,8,9-HxCDD	649		4.06	50.0	1.26	1.007	1
1,2,3,4,6,7,8-HpCDD	2570		20.0	50.0	0.98	1.000	1
OCDD	1940		5.42	100	0.87	1.000	1
2,3,7,8-TCDF	1700		13.1	13.1	0.75	1.001	1
1,2,3,7,8-PeCDF	2450		154	154	1.57	1.001	1
2,3,4,7,8-PeCDF	6160		157	157	1.50	1.028	1
1,2,3,4,7,8-HxCDF	5750		68.0	68.0	1.19	0.998	1
1,2,3,6,7,8-HxCDF	5040		56.5	56.5	1.22	1.000	1
1,2,3,7,8,9-HxCDF	1590		78.6	78.6	1.18	1.036	1
2,3,4,6,7,8-HxCDF	6230		66.2	66.2	1.22	1.014	1
1,2,3,4,6,7,8-HpCDF	14000		72.5	72.5	0.99	1.000	1
1,2,3,4,7,8,9-HpCDF	1660		90.9	90.9	1.02	1.037	1
OCDF	4230		13.0	100	0.85	1.006	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 12:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R2 903-36-002	**Units:**	pg
Lab Code:	E2001165-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 16:21
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623871	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	16700		9.32	10.0	0.77		1
Total Penta-Dioxins	13900		5.04	50.0	1.50		1
Total Hexa-Dioxins	11600		4.19	50.0	1.24		1
Total Hepta-Dioxins	5360		20.0	50.0	0.99		1
Total Tetra-Furans	74400		13.1	13.1	0.75		1
Total Penta-Furans	66200		1.26	50.0			1
Total Hexa-Furans	52100		66.4	66.4	1.18		1
Total Hepta-Furans	23800		80.7	80.7	0.99		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 12:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R2 903-36-002	**Units:**	Percent
Lab Code:	E2001165-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 16:21
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623871	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	783.740	39	Y	40-130	0.78	1.020
13C-1,2,3,7,8-PeCDD	2000	1026.119	51		40-130	1.63	1.177
13C-1,2,3,6,7,8-HxCDD	2000	1039.903	52		40-130	1.24	0.993
13C-1,2,3,4,6,7,8-HpCDD	2000	817.048	41		25-130	1.02	1.065
13C-OCDD	4000	1162.733	29		25-130	0.91	1.140
13C-2,3,7,8-TCDF	2000	750.634	38	Y	40-130	0.77	0.993
13C-1,2,3,7,8-PeCDF	2000	953.759	48		40-130	1.55	1.136
13C-1,2,3,6,7,8-HxCDF	2000	877.591	44		40-130	0.51	0.974
13C-1,2,3,4,6,7,8-HpCDF	2000	701.470	35		25-130	0.42	1.040
37Cl-2,3,7,8-TCDD	2000	1797.913	90		70-130	NA	1.000
13C-1,2,3,4,7,8-HxCDD	2000	1496.772	75		70-130	1.28	0.998
13C-2,3,4,7,8-PeCDF	2000	1705.543	85		70-130	1.57	1.028
13C-1,2,3,4,7,8-HxCDF	2000	1911.502	96		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1654.643	83		70-130	0.43	1.036
13C-1,2,3,7,8,9-HxCDF	2000	827.617	41		40-130	0.50	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 12:30
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R2 903-36-002	**Units:**	pg
Lab Code:	E2001165-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23

Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**293**	9.32	10.0	1	1	293
1,2,3,7,8-PeCDD	**874**	5.04	50.0	1	1	874
1,2,3,4,7,8-HxCDD	**561**	4.67	50.0	1	0.1	56.1
1,2,3,6,7,8-HxCDD	**697**	3.91	50.0	1	0.1	69.7
1,2,3,7,8,9-HxCDD	**649**	4.06	50.0	1	0.1	64.9
1,2,3,4,6,7,8-HpCDD	**2570**	20.0	50.0	1	0.01	25.7
OCDD	**1940**	5.42	100	1	0.0003	0.582
2,3,7,8-TCDF	**1700**	13.1	13.1	1	0.1	170
1,2,3,7,8-PeCDF	**2450**	154	154	1	0.03	73.5
2,3,4,7,8-PeCDF	**6160**	157	157	1	0.3	1850
1,2,3,4,7,8-HxCDF	**5750**	68.0	68.0	1	0.1	575
1,2,3,6,7,8-HxCDF	**5040**	56.5	56.5	1	0.1	504
1,2,3,7,8,9-HxCDF	**1590**	78.6	78.6	1	0.1	159
2,3,4,6,7,8-HxCDF	**6230**	66.2	66.2	1	0.1	623
1,2,3,4,6,7,8-HpCDF	**14000**	72.5	72.5	1	0.01	140
1,2,3,4,7,8,9-HpCDF	**1660**	90.9	90.9	1	0.01	16.6
OCDF	**4230**	13.0	100	1	0.0003	1.27
		Total TEQ				5500

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 14:20
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R3 903-36-004	**Units:**	pg
Lab Code:	E2001165-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 17:11
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623872	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	748		9.61	10.0	0.76	1.001	1
1,2,3,7,8-PeCDD	1340		7.39	50.0	1.41	1.001	1
1,2,3,4,7,8-HxCDD	797		10.4	50.0	1.28	0.998	1
1,2,3,6,7,8-HxCDD	980		8.67	50.0	1.24	1.000	1
1,2,3,7,8,9-HxCDD	904		8.99	50.0	1.26	1.007	1
1,2,3,4,6,7,8-HpCDD	3670		18.6	50.0	1.00	1.000	1
OCDD	2760		8.77	100	0.88	1.000	1
2,3,7,8-TCDF	3710		33.4	33.4	0.85	1.001	1
1,2,3,7,8-PeCDF	4270		273	273	1.47	1.001	1
2,3,4,7,8-PeCDF	8420		278	278	1.54	1.028	1
1,2,3,4,7,8-HxCDF	7540		146	146	1.21	0.997	1
1,2,3,6,7,8-HxCDF	6660		121	121	1.24	1.000	1
1,2,3,7,8,9-HxCDF	1770		169	169	1.19	1.035	1
2,3,4,6,7,8-HxCDF	7720		142	142	1.23	1.014	1
1,2,3,4,6,7,8-HpCDF	19700		128	128	0.97	1.000	1
1,2,3,4,7,8,9-HpCDF	1820		161	161	1.03	1.036	1
OCDF	6570		20.9	100	0.85	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 14:20
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R3 903-36-004	**Units:**	pg
Lab Code:	E2001165-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 17:11
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623872	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	29100		9.61	10.0	0.77		1
Total Penta-Dioxins	22400		7.39	50.0	1.52		1
Total Hexa-Dioxins	15800		9.28	50.0	1.23		1
Total Hepta-Dioxins	8020		18.6	50.0	1.02		1
Total Tetra-Furans	151000		33.4	33.4	0.76		1
Total Penta-Furans	106000		1.26	50.0			1
Total Hexa-Furans	66700		142	142	1.23		1
Total Hepta-Furans	33800		143	143	0.97		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 14:20
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R3 903-36-004	**Units:**	Percent
Lab Code:	E2001165-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 17:11
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623872	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	793.724	40		40-130	0.76	1.020
13C-1,2,3,7,8-PeCDD	2000	968.828	48		40-130	1.58	1.177
13C-1,2,3,6,7,8-HxCDD	2000	1000.735	50		40-130	1.24	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	825.738	41		25-130	1.05	1.065
13C-OCDD	4000	1120.195	28		25-130	0.86	1.140
13C-2,3,7,8-TCDF	2000	733.950	37	Y	40-130	0.76	0.993
13C-1,2,3,7,8-PeCDF	2000	928.336	46		40-130	1.56	1.136
13C-1,2,3,6,7,8-HxCDF	2000	896.217	45		40-130	0.50	0.974
13C-1,2,3,4,6,7,8-HpCDF	2000	654.233	33		25-130	0.43	1.041
37Cl-2,3,7,8-TCDD	2000	1794.605	90		70-130	NA	1.000
13C-1,2,3,4,7,8-HxCDD	2000	1565.472	78		70-130	1.25	0.997
13C-2,3,4,7,8-PeCDF	2000	1657.929	83		70-130	1.55	1.028
13C-1,2,3,4,7,8-HxCDF	2000	1865.840	93		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1272.442	64	Y	70-130	0.39	1.036
13C-1,2,3,7,8,9-HxCDF	2000	918.608	46		40-130	0.50	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 14:20
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 R3 903-36-004	**Units:**	pg
Lab Code:	E2001165-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23

Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**748**	9.61	10.0	1	1	748
1,2,3,7,8-PeCDD	**1340**	7.39	50.0	1	1	1340
1,2,3,4,7,8-HxCDD	**797**	10.4	50.0	1	0.1	79.7
1,2,3,6,7,8-HxCDD	**980**	8.67	50.0	1	0.1	98.0
1,2,3,7,8,9-HxCDD	**904**	8.99	50.0	1	0.1	90.4
1,2,3,4,6,7,8-HpCDD	**3670**	18.6	50.0	1	0.01	36.7
OCDD	**2760**	8.77	100	1	0.0003	0.828
2,3,7,8-TCDF	**3710**	33.4	33.4	1	0.1	371
1,2,3,7,8-PeCDF	**4270**	273	273	1	0.03	128
2,3,4,7,8-PeCDF	**8420**	278	278	1	0.3	2530
1,2,3,4,7,8-HxCDF	**7540**	146	146	1	0.1	754
1,2,3,6,7,8-HxCDF	**6660**	121	121	1	0.1	666
1,2,3,7,8,9-HxCDF	**1770**	169	169	1	0.1	177
2,3,4,6,7,8-HxCDF	**7720**	142	142	1	0.1	772
1,2,3,4,6,7,8-HpCDF	**19700**	128	128	1	0.01	197
1,2,3,4,7,8,9-HpCDF	**1820**	161	161	1	0.01	18.2
OCDF	**6570**	20.9	100	1	0.0003	1.97
		Total TEQ				8010

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 09:00
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 Blank 903-36-001	**Units:**	pg
Lab Code:	E2001165-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 18:00
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623873	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	10.8	10.8			1
1,2,3,7,8-PeCDD	7.19**BJ**		3.59	50.0	1.62	1.000	1
1,2,3,4,7,8-HxCDD	7.76**BJ**		2.94	50.0	1.37	0.998	1
1,2,3,6,7,8-HxCDD	6.60**BJ**		2.47	50.0	1.41	1.000	1
1,2,3,7,8,9-HxCDD	4.91**BJK**		2.56	50.0	0.81	1.006	1
1,2,3,4,6,7,8-HpCDD	24.9**BJK**		4.30	50.0	0.76	1.000	1
OCDD	58.9**BJ**		3.20	100	0.85	1.000	1
2,3,7,8-TCDF	ND	U	9.10	10.0			1
1,2,3,7,8-PeCDF	9.15**BJK**		4.57	50.0	1.14	1.001	1
2,3,4,7,8-PeCDF	21.8**BJK**		4.65	50.0	1.30	1.028	1
1,2,3,4,7,8-HxCDF	24.0**BJ**		9.17	50.0	1.36	0.997	1
1,2,3,6,7,8-HxCDF	15.7**BJK**		7.62	50.0	0.89	1.000	1
1,2,3,7,8,9-HxCDF	ND	U	10.6	50.0			1
2,3,4,6,7,8-HxCDF	22.2**BJK**		8.92	50.0	0.96	1.014	1
1,2,3,4,6,7,8-HpCDF	102		3.27	50.0	0.99	1.000	1
1,2,3,4,7,8,9-HpCDF	7.74**J**		4.10	50.0	1.16	1.037	1
OCDF	53.3**BJK**		9.00	100	0.72	1.006	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 09:00
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 Blank 903-36-001	**Units:**	pg
Lab Code:	E2001165-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 18:00
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623873	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	10.8	10.8			1
Total Penta-Dioxins	37.1**J**		3.59	50.0	1.65		1
Total Hexa-Dioxins	67.1		2.64	50.0	1.29		1
Total Hepta-Dioxins	ND	U	4.30	50.0			1
Total Tetra-Furans	ND	U	9.10	10.0			1
Total Penta-Furans	171		1.26	50.0			1
Total Hexa-Furans	24.0**J**		8.95	50.0	1.36		1
Total Hepta-Furans	141		3.64	50.0	0.99		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 09:00
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 Blank 903-36-001	**Units:**	Percent
Lab Code:	E2001165-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/11/20 18:00
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623873	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623865

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	792.666	40		40-130	0.75	1.019
13C-1,2,3,7,8-PeCDD	2000	1016.054	51		40-130	1.58	1.177
13C-1,2,3,6,7,8-HxCDD	2000	1086.867	54		40-130	1.15	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	1014.194	51		25-130	1.03	1.065
13C-OCDD	4000	1528.554	38		25-130	0.96	1.141
13C-2,3,7,8-TCDF	2000	715.019	36	Y	40-130	0.76	0.993
13C-1,2,3,7,8-PeCDF	2000	916.300	46		40-130	1.56	1.136
13C-1,2,3,6,7,8-HxCDF	2000	948.393	47		40-130	0.53	0.975
13C-1,2,3,4,6,7,8-HpCDF	2000	803.086	40		25-130	0.39	1.041
37Cl-2,3,7,8-TCDD	2000	1916.428	96		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1614.249	81		70-130	1.17	0.997
13C-2,3,4,7,8-PeCDF	2000	1904.353	95		70-130	1.58	1.028
13C-1,2,3,4,7,8-HxCDF	2000	1991.460	100		70-130	0.50	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	1376.570	69	Y	70-130	0.43	1.037
13C-1,2,3,7,8,9-HxCDF	2000	915.237	46		40-130	0.53	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	11/24/20 09:00
Sample Matrix:	Air	**Date Received:**	11/25/20 10:45
Sample Name:	TIM220419 M23 Blank 903-36-001	**Units:**	pg
Lab Code:	E2001165-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method: 23

Prep Method: Method

Toxicity Equivalency Quotient

Analyte Name	Result	DL	MRL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	10.8	10.8	1	1	
1,2,3,7,8-PeCDD	**7.19**	3.59	50.0	1	1	7.19
1,2,3,4,7,8-HxCDD	**7.76**	2.94	50.0	1	0.1	0.776
1,2,3,6,7,8-HxCDD	**6.60**	2.47	50.0	1	0.1	0.660
1,2,3,7,8,9-HxCDD	**4.91**	2.56	50.0	1	0.1	0.491
1,2,3,4,6,7,8-HpCDD	**24.9**	4.30	50.0	1	0.01	0.249
OCDD	**58.9**	3.20	100	1	0.0003	0.0177
2,3,7,8-TCDF	ND	9.10	10.0	1	0.1	
1,2,3,7,8-PeCDF	**9.15**	4.57	50.0	1	0.03	0.275
2,3,4,7,8-PeCDF	**21.8**	4.65	50.0	1	0.3	6.54
1,2,3,4,7,8-HxCDF	**24.0**	9.17	50.0	1	0.1	2.40
1,2,3,6,7,8-HxCDF	**15.7**	7.62	50.0	1	0.1	1.57
1,2,3,7,8,9-HxCDF	ND	10.6	50.0	1	0.1	
2,3,4,6,7,8-HxCDF	**22.2**	8.92	50.0	1	0.1	2.22
1,2,3,4,6,7,8-HpCDF	**102**	3.27	50.0	1	0.01	1.02
1,2,3,4,7,8,9-HpCDF	**7.74**	4.10	50.0	1	0.01	0.0774
OCDF	**53.3**	9.00	100	1	0.0003	0.0160
		Total TEQ				23.5

2005 WHO TEFs, ND = 0

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	pg
Lab Code:	EQ2000642-01	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 17:18
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623934	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	6.35	10.0			1
1,2,3,7,8-PeCDD	5.43**JK**		1.79	50.0	1.29	1.001	1
1,2,3,4,7,8-HxCDD	6.44**J**		2.15	50.0	1.08	0.998	1
1,2,3,6,7,8-HxCDD	4.07**JK**		1.81	50.0	1.76	1.000	1
1,2,3,7,8,9-HxCDD	5.02**JK**		1.87	50.0	1.48	1.007	1
1,2,3,4,6,7,8-HpCDD	8.66**J**		3.00	50.0	1.08	1.001	1
OCDD	31.4**JK**		6.91	100	0.55	1.000	1
2,3,7,8-TCDF	ND	U	3.92	10.0			1
1,2,3,7,8-PeCDF	3.55**JK**		1.71	50.0	3.09	1.001	1
2,3,4,7,8-PeCDF	5.56**JK**		1.74	50.0	1.99	1.028	1
1,2,3,4,7,8-HxCDF	6.75**J**		2.03	50.0	1.37	0.998	1
1,2,3,6,7,8-HxCDF	5.88**J**		1.69	50.0	1.35	1.001	1
1,2,3,7,8,9-HxCDF	5.74**JK**		2.34	50.0	1.57	1.035	1
2,3,4,6,7,8-HxCDF	6.20**JK**		1.97	50.0	0.98	1.014	1
1,2,3,4,6,7,8-HpCDF	8.99**JK**		2.24	50.0	0.82	1.000	1
1,2,3,4,7,8,9-HpCDF	ND	U	2.81	50.0			1
OCDF	45.5**J**		6.05	100	0.86	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	pg
Lab Code:	EQ2000642-01	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 17:18
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623934	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	ND	U	6.35	10.0			1
Total Penta-Dioxins	ND	U	1.79	50.0			1
Total Hexa-Dioxins	6.44**J**		1.93	50.0	1.08		1
Total Hepta-Dioxins	8.66**J**		3.00	50.0	1.08		1
Total Tetra-Furans	ND	U	3.92	10.0			1
Total Penta-Furans	ND	U	1.26	50.0			1
Total Hexa-Furans	12.6**J**		1.98	50.0	1.37		1
Total Hepta-Furans	ND	U	2.49	50.0			1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	EQ2000642-01	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 17:18
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623934	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2712.186	68		40-130	0.77	1.020
13C-1,2,3,7,8-PeCDD	4000	4443.846	111		40-130	1.61	1.177
13C-1,2,3,6,7,8-HxCDD	4000	5578.698	139	Y	40-130	1.25	0.994
13C-1,2,3,4,6,7,8-HpCDD	4000	4438.672	111		25-130	1.03	1.065
13C-OCDD	8000	6986.519	87		25-130	0.89	1.140
13C-2,3,7,8-TCDF	4000	2466.723	62		40-130	0.78	0.993
13C-1,2,3,7,8-PeCDF	4000	3767.935	94		40-130	1.57	1.136
13C-1,2,3,6,7,8-HxCDF	4000	4149.068	104		40-130	0.51	0.974
13C-1,2,3,4,6,7,8-HpCDF	4000	3629.235	91		25-130	0.43	1.041
37Cl-2,3,7,8-TCDD	2000	1923.031	96		70-130	NA	1.000
13C-1,2,3,4,7,8-HxCDD	2000	1547.595	77		70-130	1.24	0.998
13C-2,3,4,7,8-PeCDF	2000	1995.427	100		70-130	1.54	1.028
13C-1,2,3,4,7,8-HxCDF	2000	2010.692	101		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	2340.955	117		70-130	0.43	1.036
13C-1,2,3,7,8,9-HxCDF	2000	4613.319	231	Y	40-130	0.50	1.008

Accuracy & Precision

ALS Environmental - Houston HRMS
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (713)266-1599 Fax (713)266-0130
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Analyzed:**	12/14/20
Sample Matrix:	Air	**Date Extracted:**	12/03/20

Duplicate Lab Control Sample Summary
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Units:**	pg
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	707085

	Lab Control Sample EQ2000642-02			Duplicate Lab Control Sample EQ2000642-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,2,3,4,6,7,8-HpCDD	2310	2000	116	2110	2000	105	70-130	9	20
1,2,3,4,7,8-HxCDD	2140	2000	107	2250	2000	113	70-130	5	20
1,2,3,6,7,8-HxCDD	2350	2000	118	2440	2000	122	70-130	4	20
1,2,3,7,8,9-HxCDD	2350	2000	118	2240	2000	112	70-130	5	20
1,2,3,7,8-PeCDD	2550	2000	127	2480	2000	124	70-130	3	20
2,3,7,8-TCDD	522	400	131 *	509	400	127	70-130	3	20
OCDD	4710	4000	118	4560	4000	114	70-130	3	20
1,2,3,4,6,7,8-HpCDF	2480	2000	124	2380	2000	119	70-130	4	20
1,2,3,4,7,8,9-HpCDF	3330	2000	166 *	3560	2000	178 *	70-130	7	20
1,2,3,4,7,8-HxCDF	2420	2000	121	2380	2000	119	70-130	2	20
1,2,3,6,7,8-HxCDF	2480	2000	124	2410	2000	121	70-130	3	20
1,2,3,7,8,9-HxCDF	2740	2000	137 *	2710	2000	136 *	70-130	1	20
1,2,3,7,8-PeCDF	2380	2000	119	2240	2000	112	70-130	6	20
2,3,4,6,7,8-HxCDF	2520	2000	126	2320	2000	116	70-130	8	20
2,3,4,7,8-PeCDF	2550	2000	127	2620	2000	131 *	70-130	3	20
2,3,7,8-TCDF	445	400	111	423	400	106	70-130	5	20
OCDF	5330	4000	133 *	5310	4000	133 *	70-130	<1	20

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	pg
Lab Code:	EQ2000642-02	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 20:37
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623938	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	522		6.99	10.0	0.77	1.001	1
1,2,3,7,8-PeCDD	2550		2.63	50.0	1.55	1.000	1
1,2,3,4,7,8-HxCDD	2140		1.92	50.0	1.25	0.998	1
1,2,3,6,7,8-HxCDD	2350		1.61	50.0	1.22	1.000	1
1,2,3,7,8,9-HxCDD	2350		1.67	50.0	1.23	1.007	1
1,2,3,4,6,7,8-HpCDD	2310		2.90	50.0	1.04	1.000	1
OCDD	4710		4.09	100	0.85	1.000	1
2,3,7,8-TCDF	445		5.14	10.0	0.73	1.001	1
1,2,3,7,8-PeCDF	2380		2.85	50.0	1.51	1.001	1
2,3,4,7,8-PeCDF	2550		2.90	50.0	1.51	1.028	1
1,2,3,4,7,8-HxCDF	2420		2.04	50.0	1.21	0.997	1
1,2,3,6,7,8-HxCDF	2480		1.69	50.0	1.20	1.000	1
1,2,3,7,8,9-HxCDF	2740		2.35	50.0	1.18	1.035	1
2,3,4,6,7,8-HxCDF	2520		1.98	50.0	1.18	1.014	1
1,2,3,4,6,7,8-HpCDF	2480		7.85	50.0	1.00	1.000	1
1,2,3,4,7,8,9-HpCDF	3330		9.84	50.0	1.03	1.037	1
OCDF	5330		7.03	100	0.90	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	pg
Lab Code:	EQ2000642-02	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 20:37
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623938	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	522		6.99	10.0	0.77		1
Total Penta-Dioxins	2550		2.63	50.0	1.55		1
Total Hexa-Dioxins	6850		1.72	50.0	1.25		1
Total Hepta-Dioxins	2310		2.90	50.0	1.04		1
Total Tetra-Furans	445		5.14	10.0	0.73		1
Total Penta-Furans	4940		1.26	50.0			1
Total Hexa-Furans	10200		1.99	50.0	1.21		1
Total Hepta-Furans	5810		8.74	50.0	1.00		1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	Percent
Lab Code:	EQ2000642-02	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 20:37
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623938	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	599.777	30	Y	40-130	0.77	1.020
13C-1,2,3,7,8-PeCDD	2000	936.392	47		40-130	1.61	1.177
13C-1,2,3,6,7,8-HxCDD	2000	1100.451	55		40-130	1.37	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	892.934	45		25-130	1.06	1.066
13C-OCDD	4000	1242.497	31		25-130	0.88	1.140
13C-2,3,7,8-TCDF	2000	549.767	27	Y	40-130	0.74	0.993
13C-1,2,3,7,8-PeCDF	2000	815.724	41		40-130	1.56	1.137
13C-1,2,3,6,7,8-HxCDF	2000	889.759	44		40-130	0.51	0.975
13C-1,2,3,4,6,7,8-HpCDF	2000	712.513	36		25-130	0.43	1.041
37Cl-2,3,7,8-TCDD	2000	2096.845	105		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	2000	1625.074	81		70-130	1.36	0.998
13C-2,3,4,7,8-PeCDF	2000	2064.584	103		70-130	1.54	1.028
13C-1,2,3,4,7,8-HxCDF	2000	2088.209	104		70-130	0.51	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	2497.879	125		70-130	0.42	1.036
13C-1,2,3,7,8,9-HxCDF	2000	1181.084	59		40-130	0.51	1.008

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	pg
Lab Code:	EQ2000642-03	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 21:27
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623939	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	509		16.6	16.6	0.71	1.000	1
1,2,3,7,8-PeCDD	2480		3.52	50.0	1.54	1.000	1
1,2,3,4,7,8-HxCDD	2250		2.34	50.0	1.21	0.998	1
1,2,3,6,7,8-HxCDD	2440		1.96	50.0	1.23	1.000	1
1,2,3,7,8,9-HxCDD	2240		2.03	50.0	1.29	1.007	1
1,2,3,4,6,7,8-HpCDD	2110		3.11	50.0	0.99	1.000	1
OCDD	4560		7.32	100	0.93	1.000	1
2,3,7,8-TCDF	423		10.8	10.8	0.76	1.001	1
1,2,3,7,8-PeCDF	2240		4.69	50.0	1.51	1.001	1
2,3,4,7,8-PeCDF	2620		4.78	50.0	1.57	1.028	1
1,2,3,4,7,8-HxCDF	2380		3.66	50.0	1.22	0.998	1
1,2,3,6,7,8-HxCDF	2410		3.04	50.0	1.22	1.000	1
1,2,3,7,8,9-HxCDF	2710		4.23	50.0	1.23	1.035	1
2,3,4,6,7,8-HxCDF	2320		3.56	50.0	1.27	1.014	1
1,2,3,4,6,7,8-HpCDF	2380		15.0	50.0	1.01	1.000	1
1,2,3,4,7,8,9-HpCDF	3560		18.8	50.0	1.00	1.036	1
OCDF	5310		11.0	100	0.89	1.005	1

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	pg
Lab Code:	EQ2000642-03	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 21:27
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623939	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Native Analyte Results

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
Total Tetra-Dioxins	509		16.6	16.6	0.71		1
Total Penta-Dioxins	2490		3.52	50.0	1.54		1
Total Hexa-Dioxins	6940		2.10	50.0	1.21		1
Total Hepta-Dioxins	2110		3.11	50.0	0.99		1
Total Tetra-Furans	423		10.8	10.8	0.76		1
Total Penta-Furans	4900		1.26	50.0			1
Total Hexa-Furans	9820		3.57	50.0	1.22		1
Total Hepta-Furans	5970		16.7	50.0	1.01		1

Client:	Bison Engineering, Incorporated	**Service Request:**	E2001165
Project:	Tucson Iron & Metals/TIM220419	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	Percent
Lab Code:	EQ2000642-03	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analysis Method:	23	**Date Analyzed:**	12/14/20 21:27
Prep Method:	Method	**Date Extracted:**	12/3/20
Sample Amount:	0.5000Sample	**Instrument Name:**	E-HRMS-08
		GC Column:	DB-5MSUI
Data File Name:	P623939	**Blank File Name:**	P623934
ICAL Date:	12/04/20	**Cal Ver. File Name:**	P623927

Labeled Standard Results

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	% Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	2000	268.644	13	Y	40-130	0.77	1.020
13C-1,2,3,7,8-PeCDD	2000	534.874	27	Y	40-130	1.57	1.177
13C-1,2,3,6,7,8-HxCDD	2000	676.840	34	Y	40-130	1.13	0.994
13C-1,2,3,4,6,7,8-HpCDD	2000	595.404	30		25-130	1.07	1.065
13C-OCDD	4000	750.187	19	Y	25-130	0.89	1.140
13C-2,3,7,8-TCDF	2000	238.337	12	Y	40-130	0.75	0.994
13C-1,2,3,7,8-PeCDF	2000	423.304	21	Y	40-130	1.54	1.137
13C-1,2,3,6,7,8-HxCDF	2000	563.008	28	Y	40-130	0.50	0.974
13C-1,2,3,4,6,7,8-HpCDF	2000	446.769	22	Y	25-130	0.43	1.041
37Cl-2,3,7,8-TCDD	2000	2164.906	108		70-130	NA	1.000
13C-1,2,3,4,7,8-HxCDD	2000	1699.874	85		70-130	1.18	0.998
13C-2,3,4,7,8-PeCDF	2000	2157.766	108		70-130	1.52	1.028
13C-1,2,3,4,7,8-HxCDF	2000	2094.442	105		70-130	0.52	0.997
13C-1,2,3,4,7,8,9-HpCDF	2000	2654.645	133	Y	70-130	0.41	1.036
13C-1,2,3,7,8,9-HxCDF	2000	697.717	35	Y	40-130	0.50	1.008

APPENDIX D: PLANT OPERATING RECORDS

ED_005878_00000192-00098

MINUTE EMISSIONS

COMPANY: AMCEP
LOCATION: Tucson AZ.
SOURCE: Contraband Incinerator
CEMS ID: 1234567
DATE CREATED: 11/24/2020 @ 15:01

PERIOD: 11/24/2020 09:05 - 11/24/2020 10:18

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 09:05	8	1	18.6	2.4	0.0	14.3	1465.5	3.1	0	0
11/24/2020 09:06	8	1	18.8	2.4	0.0	15.2	1457.5	3.1	0	0
11/24/2020 09:07	8	1	18.6	2.7	0.0	16.8	1454.8	3.1	0	0
11/24/2020 09:08	8	1	18.7	3.0	0.0	18.5	1452.0	3.1	0	0
11/24/2020 09:09	8	1	18.6	2.9	0.0	17.4	1455.5	3.1	0	0
11/24/2020 09:10	8	1	18.6	2.6	0.0	15.7	1458.5	3.1	0	0
11/24/2020 09:11	8	1	18.6	2.4	0.0	14.1	1461.5	3.1	0	0
11/24/2020 09:12	8	1	18.5	2.1	0.0	12.3	1462.5	3.1	0	0
11/24/2020 09:13	8	1	18.6	1.9	0.0	11.3	1466.3	3.1	0	0
11/24/2020 09:14	8	1	18.6	2.1	0.0	12.9	1462.3	3.1	0	0
11/24/2020 09:15	8	1	18.6	2.3	0.0	14.2	1459.0	3.1	0	0
11/24/2020 09:16	8	1	18.7	2.5	0.0	15.6	1460.4	3.2	0	0
11/24/2020 09:17	8	1	18.4	2.5	0.0	14.2	1469.5	3.1	0	0
11/24/2020 09:18	8	1	18.5	2.7	0.0	15.4	1481.5	3.2	0	0
11/24/2020 09:19	8	1	18.3	2.7	0.0	14.3	1511.5	3.2	0	0
11/24/2020 09:20	8	1	18.3	2.5	0.0	13.5	1507.9	3.2	0	0
11/24/2020 09:21	8	1	18.6	2.2	0.0	13.4	1492.4	3.2	0	0
11/24/2020 09:22	8	1	18.7	2.2	0.0	14.0	1475.8	3.2	0	0
11/24/2020 09:23	8	1	18.9	2.8	0.0	19.8	1465.3	3.2	0	0
11/24/2020 09:24	8	1	18.7	3.3	0.0	20.6	1462.2	3.2	0	0
11/24/2020 09:25	8	1	18.8	3.4	0.0	22.7	1454.4	3.2	0	0
11/24/2020 09:26	8	1	18.9	3.1	0.0	21.4	1449.1	3.2	0	0
11/24/2020 09:27	8	1	18.7	3.6	0.0	22.3	1453.4	3.2	0	0
11/24/2020 09:28	8	1	18.6	4.0	0.0	24.1	1457.8	3.2	0	0
11/24/2020 09:29	8	1	18.6	3.7	0.0	22.9	1459.3	3.2	0	0
11/24/2020 09:30	8	1	18.7	3.1	0.0	19.7	1457.0	3.2	0	0
11/24/2020 09:31	8	1	18.8	3.1	0.0	20.3	1454.4	3.3	0	0
11/24/2020 09:32	8	1	18.6	3.6	0.0	21.6	1462.7	3.3	0	0
11/24/2020 09:33	8	1	18.6	4.0	0.0	23.8	1463.4	3.3	0	0
11/24/2020 09:34	8	1	18.6	4.0	0.0	24.3	1468.0	3.3	0	0
11/24/2020 09:35	8	1	18.5	3.9	0.0	22.5	1470.3	3.3	0	0
11/24/2020 09:36	8	1	18.7	3.8	0.0	23.3	1463.8	3.3	0	0
11/24/2020 09:37	8	1	18.8	4.5	0.0	30.1	1454.3	3.3	0	0
11/24/2020 09:38	8	1	19.0	11.8	0.0	87.5	1448.2	3.3	0	0
11/24/2020 09:39	8	1	18.6	8.1	0.0	49.9	1447.6	3.3	0	0
11/24/2020 09:40	8	1	18.7	7.7	0.0	49.5	1448.0	3.3	0	0
11/24/2020 09:41	8	1	18.5	7.6	0.0	43.9	1466.2	3.3	0	0
11/24/2020 09:42	8	1	18.3	8.0	0.0	42.5	1480.2	3.3	0	0
11/24/2020 09:43	8	1	18.4	7.3	0.0	39.9	1493.2	3.3	0	0
11/24/2020 09:44	8	1	18.4	7.2	0.0	39.3	1486.8	3.3	0	0
11/24/2020 09:45	8	1	18.6	6.7	0.0	39.9	1478.5	3.3	0	0
11/24/2020 09:46	8	1	18.7	5.8	0.0	36.2	1469.6	3.3	0	0
11/24/2020 09:47	8	1	18.9	3.9	0.0	26.7	1462.1	3.3	0	0
11/24/2020 09:48	8	1	18.6	3.6	0.0	22.3	1467.9	3.4	0	0
11/24/2020 09:49	8	1	18.5	3.8	0.0	21.9	1477.3	3.4	0	0
11/24/2020 09:50	8	1	18.4	3.8	0.0	20.6	1489.8	3.4	0	0
11/24/2020 09:51	8	1	18.3	3.9	0.0	20.6	1498.3	3.4	0	0
11/24/2020 09:52	8	1	18.3	3.8	0.0	20.9	1493.1	3.4	0	0
11/24/2020 09:53	8	1	18.5	4.0	0.0	23.2	1487.8	3.6	0	0
11/24/2020 09:54	8	1	18.5	4.3	0.0	25.1	1483.3	3.7	0	0
11/24/2020 09:55	8	1	18.6	5.2	0.0	30.9	1472.5	3.7	0	0
11/24/2020 09:56	8	1	18.8	5.5	0.0	36.2	1463.4	3.7	0	0
11/24/2020 09:57	8	1	18.6	5.4	0.0	32.5	1462.5	3.7	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 09:58	8	1	18.6	5.0	0.0	30.5	1460.6	3.7	0	0
11/24/2020 09:59	8	1	18.6	5.0	0.0	30.7	1460.3	3.7	0	0
11/24/2020 10:00	8	1	18.6	4.4	0.0	27.0	1461.9	3.7	0	0
11/24/2020 10:01	8	1	18.6	3.6	0.0	21.6	1466.7	3.7	0	0
11/24/2020 10:02	8	1	18.7	3.6	0.0	22.7	1452.3	3.7	0	0
11/24/2020 10:03	8	1	19.0	5.8	0.0	41.8	1403.8	3.7	0	0
11/24/2020 10:04	8	1	19.0	14.8	0.0	111.0	1368.8	3.7	0	0
11/24/2020 10:05	8	1	18.8	16.6	0.0	110.4	1356.0	3.7	0	0
11/24/2020 10:06	8	1	18.5	32.5	0.0	189.9	1369.2	3.6	0	0
11/24/2020 10:07	8	1	18.4	21.1	0.0	117.7	1393.7	3.6	0	0
11/24/2020 10:08	8	1	18.5	11.7	0.0	68.3	1389.9	3.6	0	0
11/24/2020 10:09	8	1	18.6	9.8	0.0	59.6	1376.1	3.6	0	0
11/24/2020 10:10	8	1	18.8	9.6	0.0	62.5	1379.3	3.5	0	0
11/24/2020 10:11	8	1	18.3	14.3	0.0	77.3	1404.7	3.5	0	0
11/24/2020 10:12	8	1	18.4	14.0	0.0	78.1	1402.5	3.5	0	0
11/24/2020 10:13	8	1	18.6	10.7	0.0	64.9	1394.3	3.5	0	0
11/24/2020 10:14	8	1	18.6	6.8	0.0	40.7	1400.3	3.3	0	0
11/24/2020 10:15	8	1	18.5	6.7	0.0	38.2	1442.3	3.3	0	0
11/24/2020 10:16	8	1	18.2	7.4	0.0	37.8	1490.9	3.3	0	0
11/24/2020 10:17	8	1	18.2	3.7	0.0	19.2	1540.2	3.3	0	0
11/24/2020 10:18	8	1	18.1	4.7	0.0	23.0	1610.6	3.3	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.6	5.8	0.0	34.9	1457.4	3.4	0	
TOTAL		74								0
MIN VALUE			18.1	1.9	0.0	11.3	1356.0	3.1	0	
MIN TIME			10:18	09:13	09:05	09:13	10:05	09:05	09:05	
MIN DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	
MAX VALUE			19.0	32.5	0.0	189.9	1610.6	3.7	0	
MAX TIME			10:04	10:06	10:18	10:06	10:18	10:05	10:18	
MAX DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	

MINUTE EMISSIONS

COMPANY: AMCEP
LOCATION: Tucson AZ.
SOURCE: Contraband Incinerator
CEMS ID: 1234567
DATE CREATED: 11/24/2020 @ 15:02

PERIOD: 11/24/2020 10:59 - 11/24/2020 12:30

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 10:59	8	1	18.4	1.4	0.0	7.5	1557.1	3.9	0	0
11/24/2020 11:00	8	1	18.6	1.1	0.0	6.9	1544.5	3.8	0	0
11/24/2020 11:01	8	1	18.7	1.1	0.0	7.1	1537.4	3.7	0	0
11/24/2020 11:02	8	1	18.5	1.5	0.0	8.6	1546.0	3.7	0	0
11/24/2020 11:03	8	1	18.5	1.8	0.0	10.8	1560.5	3.7	0	0
11/24/2020 11:04	8	1	18.4	2.0	0.0	11.1	1576.9	3.6	0	0
11/24/2020 11:05	8	1	18.5	1.8	0.0	10.2	1579.8	3.5	0	0
11/24/2020 11:06	8	1	18.4	1.5	0.0	8.4	1587.7	3.5	0	0
11/24/2020 11:07	8	1	18.5	1.2	0.0	6.9	1599.6	3.5	0	0
11/24/2020 11:08	8	1	18.3	0.9	0.0	4.9	1629.3	3.5	0	0
11/24/2020 11:09	8	1	18.3	0.8	0.0	4.3	1620.2	3.4	0	0
11/24/2020 11:10	8	1	18.5	0.8	0.0	4.9	1613.1	3.4	0	0
11/24/2020 11:11	8	1	18.3	0.9	0.0	4.7	1618.3	3.3	0	0
11/24/2020 11:12	8	1	18.3	0.8	0.0	4.0	1637.3	3.3	0	0
11/24/2020 11:13	8	1	18.1	0.8	0.0	3.8	1671.1	3.3	0	0
11/24/2020 11:14	8	1	18.2	5.2	0.0	26.6	1681.8	3.2	0	0
11/24/2020 11:15	8	1	18.3	12.5	0.0	65.5	1677.3	3.2	0	0
11/24/2020 11:16	8	1	18.3	6.7	0.0	35.3	1659.9	3.2	0	0
11/24/2020 11:17	8	1	18.5	1.6	0.0	9.3	1639.7	3.1	0	0
11/24/2020 11:18	8	1	18.7	1.1	0.0	7.1	1610.0	3.1	0	0
11/24/2020 11:19	8	1	18.7	1.1	0.0	7.0	1594.0	3.0	0	0
11/24/2020 11:20	8	1	18.5	1.1	0.0	6.4	1598.7	3.0	0	0
11/24/2020 11:21	8	1	18.6	1.0	0.0	6.2	1597.2	2.9	0	0
11/24/2020 11:22	8	1	18.5	1.0	0.0	5.7	1603.1	3.0	0	0
11/24/2020 11:23	8	1	18.6	1.0	0.0	6.0	1604.6	2.9	0	0
11/24/2020 11:24	8	1	18.5	1.0	0.0	6.0	1612.7	2.9	0	0
11/24/2020 11:25	8	1	18.6	0.9	0.0	5.2	1609.4	2.9	0	0
11/24/2020 11:26	8	1	18.7	0.8	0.0	5.0	1600.3	2.9	0	0
11/24/2020 11:27	8	1	18.5	0.9	0.0	5.2	1606.3	2.9	0	0
11/24/2020 11:28	8	1	18.4	1.0	0.0	5.7	1618.5	2.9	0	0
11/24/2020 11:29	8	1	18.3	1.1	0.0	5.9	1629.5	2.9	0	0
11/24/2020 11:30	8	1	18.6	1.1	0.0	6.3	1624.5	2.9	0	0
11/24/2020 11:31	8	1	18.4	1.0	0.0	5.4	1637.0	2.8	0	0
11/24/2020 11:32	8	1	18.4	0.9	0.0	5.0	1637.8	2.8	0	0
11/24/2020 11:33	8	1	18.6	0.9	0.0	5.5	1633.5	2.8	0	0
11/24/2020 11:34	8	1	18.7	0.9	0.0	5.4	1612.3	2.8	0	0
11/24/2020 11:35	8	1	18.9	0.8	0.0	5.8	1596.0	2.8	0	0
11/24/2020 11:36	8	1	18.7	1.0	0.0	6.1	1589.0	2.8	0	0
11/24/2020 11:37	8	1	18.7	1.0	0.0	6.5	1591.8	2.8	0	0
11/24/2020 11:38	8	1	18.6	1.1	0.0	6.8	1591.3	2.8	0	0
11/24/2020 11:39	8	1	18.6	1.1	0.0	6.7	1609.3	2.8	0	0
11/24/2020 11:40	8	1	18.6	0.9	0.0	5.5	1609.5	2.8	0	0
11/24/2020 11:41	8	1	18.6	0.7	0.0	4.4	1612.6	2.8	0	0
11/24/2020 11:42	8	1	18.6	0.6	0.0	3.7	1623.4	2.8	0	0
11/24/2020 11:43	8	1	18.3	0.7	0.0	3.6	1630.1	2.8	0	0
11/24/2020 11:44	8	1	18.6	0.8	0.0	4.6	1619.5	2.8	0	0
11/24/2020 11:45	8	1	18.5	0.9	0.0	4.9	1630.9	2.8	0	0
11/24/2020 11:46	8	1	18.3	0.9	0.0	4.7	1647.5	2.8	0	0
11/24/2020 11:47	8	1	18.3	0.9	0.0	4.6	1656.2	2.8	0	0
11/24/2020 11:48	8	1	18.4	0.8	0.0	4.5	1658.2	2.8	0	0
11/24/2020 11:49	8	1	18.4	0.9	0.0	4.8	1663.6	2.8	0	0
11/24/2020 11:50	8	1	18.4	0.8	0.0	4.5	1667.7	2.8	0	0
11/24/2020 11:51	8	1	18.4	0.8	0.0	4.5	1679.6	2.8	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 11:52	8	1	18.4	0.8	0.0	4.4	1680.0	2.8	0	0
11/24/2020 11:53	8	1	18.5	0.8	0.0	4.6	1671.2	2.8	0	0
11/24/2020 11:54	8	1	18.6	0.8	0.0	4.7	1658.4	2.8	0	0
11/24/2020 11:55	8	1	18.7	0.7	0.0	4.5	1639.8	2.8	0	0
11/24/2020 11:56	8	1	18.8	0.7	0.0	4.7	1623.2	2.7	0	0
11/24/2020 11:57	8	1	18.8	0.7	0.0	4.6	1613.8	2.7	0	0
11/24/2020 11:58	8	1	18.8	0.7	0.0	4.5	1612.4	2.7	0	0
11/24/2020 11:59	8	1	18.7	0.7	0.0	4.4	1611.4	2.8	0	0
11/24/2020 12:00	8	1	18.7	0.7	0.0	4.2	1613.6	2.8	0	0
11/24/2020 12:01	8	1	18.7	0.6	0.0	3.8	1614.9	2.7	0	0
11/24/2020 12:02	8	1	18.9	0.6	0.0	4.1	1607.8	2.7	0	0
11/24/2020 12:03	8	1	18.8	0.6	0.0	4.0	1592.3	2.7	0	0
11/24/2020 12:04	8	1	19.1	0.7	0.0	5.5	1564.6	2.7	0	0
11/24/2020 12:05	8	1	19.2	1.0	0.0	8.1	1541.8	2.7	0	0
11/24/2020 12:06	8	1	19.1	1.3	0.0	10.5	1528.1	2.7	0	0
11/24/2020 12:07	8	1	19.0	1.6	0.0	11.4	1523.4	2.7	0	0
11/24/2020 12:08	8	1	19.0	1.6	0.0	11.9	1518.3	2.7	0	0
11/24/2020 12:09	8	1	19.0	1.7	0.0	12.4	1517.9	2.7	0	0
11/24/2020 12:10	8	1	18.8	1.8	0.0	12.1	1523.8	2.7	0	0
11/24/2020 12:11	8	1	18.9	1.7	0.0	11.6	1522.9	2.7	0	0
11/24/2020 12:12	8	1	19.0	1.4	0.0	10.8	1516.3	2.7	0	0
11/24/2020 12:13	8	1	19.0	1.6	0.0	11.7	1513.5	2.7	0	0
11/24/2020 12:14	8	1	19.0	1.8	0.0	12.7	1515.6	2.7	0	0
11/24/2020 12:15	8	1	19.0	1.8	0.0	12.7	1516.1	2.7	0	0
11/24/2020 12:16	8	1	19.0	1.6	0.0	11.3	1519.5	2.7	0	0
11/24/2020 12:17	8	1	18.8	1.4	0.0	9.3	1521.8	2.7	0	0
11/24/2020 12:18	8	1	18.8	1.4	0.0	9.1	1522.7	2.7	0	0
11/24/2020 12:19	8	1	18.8	1.7	0.0	11.2	1526.9	2.7	0	0
11/24/2020 12:20	8	1	18.8	1.7	0.0	11.4	1543.9	2.6	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.6	1.3	0.0	8.1	1599.0	2.9	0	
TOTAL		82								0
MIN VALUE			18.1	0.6	0.0	3.6	1513.5	2.6	0	
MIN TIME			11:13	11:42	10:59	11:43	12:13	12:20	10:59	
MIN DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	
MAX VALUE			19.2	12.5	0.0	65.5	1681.8	3.9	0	
MAX TIME			12:05	11:15	12:20	11:15	11:14	10:59	12:20	
MAX DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	

MINUTE EMISSIONS

COMPANY: AMCEP
LOCATION: Tucson AZ.
SOURCE: Contraband Incinerator
CEMS ID: 1234567
DATE CREATED: 11/24/2020 @ 15:04

PERIOD: 11/24/2020 12:54 - 11/24/2020 14:00

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 12:54	8	1	18.6	0.5	0.0	3.0	1679.3	2.6	0	0
11/24/2020 12:55	8	1	18.5	0.5	0.0	2.9	1688.7	2.6	0	0
11/24/2020 12:56	8	1	18.7	0.4	0.0	2.5	1686.3	2.6	0	0
11/24/2020 12:57	8	1	18.6	0.5	0.0	2.7	1696.5	2.6	0	0
11/24/2020 12:58	8	1	18.6	0.5	0.0	3.0	1700.6	2.6	0	0
11/24/2020 12:59	8	1	18.5	0.5	0.0	2.9	1705.6	2.6	0	0
11/24/2020 13:00	8	1	18.6	0.5	0.0	3.0	1705.1	2.6	0	0
11/24/2020 13:01	8	1	18.5	0.5	0.0	3.0	1707.8	2.6	0	0
11/24/2020 13:02	8	1	18.6	0.6	0.0	3.5	1704.3	2.6	0	0
11/24/2020 13:03	8	1	18.6	0.6	0.0	3.6	1697.6	2.6	0	0
11/24/2020 13:04	8	1	18.7	0.6	0.0	3.7	1692.6	2.6	0	0
11/24/2020 13:05	8	1	18.6	0.5	0.0	3.0	1695.7	2.6	0	0
11/24/2020 13:06	8	1	18.6	0.5	0.0	3.0	1698.8	2.5	0	0
11/24/2020 13:07	8	1	18.6	0.5	0.0	3.0	1699.9	2.5	0	0
11/24/2020 13:08	8	1	18.6	0.5	0.0	3.0	1708.1	2.5	0	0
11/24/2020 13:09	8	1	18.4	0.5	0.0	2.8	1717.2	2.6	0	0
11/24/2020 13:10	8	1	18.4	0.5	0.0	2.8	1717.1	2.6	0	0
11/24/2020 13:11	8	1	18.5	0.5	0.0	2.9	1709.3	2.6	0	0
11/24/2020 13:12	8	1	18.5	0.5	0.0	2.9	1706.4	2.6	0	0
11/24/2020 13:13	8	1	18.5	0.5	0.0	3.0	1696.3	2.6	0	0
11/24/2020 13:14	8	1	18.6	0.5	0.0	3.0	1696.2	2.6	0	0
11/24/2020 13:15	8	1	18.5	0.5	0.0	2.9	1698.2	2.6	0	0
11/24/2020 13:16	8	1	18.5	0.5	0.0	2.9	1693.6	2.6	0	0
11/24/2020 13:17	8	1	18.6	0.5	0.0	3.1	1689.0	2.5	0	0
11/24/2020 13:18	8	1	18.7	0.5	0.0	3.2	1676.2	2.6	0	0
11/24/2020 13:19	8	1	18.6	0.5	0.0	3.0	1686.0	2.6	0	0
11/24/2020 13:20	8	1	18.5	0.6	0.0	3.4	1698.0	2.6	0	0
11/24/2020 13:21	8	1	18.5	0.6	0.0	3.5	1700.5	2.6	0	0
11/24/2020 13:22	8	1	18.6	0.8	0.0	4.8	1687.1	2.5	0	0
11/24/2020 13:23	8	1	18.6	0.9	0.0	5.5	1675.6	2.6	0	0
11/24/2020 13:24	8	1	18.7	0.8	0.0	5.1	1670.0	2.6	0	0
11/24/2020 13:25	8	1	18.6	0.4	0.0	2.6	1673.5	2.6	0	0
11/24/2020 13:26	8	1	18.7	0.4	0.0	2.5	1680.5	2.6	0	0
11/24/2020 13:27	8	1	18.5	0.4	0.0	2.5	1682.8	2.6	0	0
11/24/2020 13:28	8	1	18.6	0.5	0.0	3.1	1680.3	2.6	0	0
11/24/2020 13:29	8	1	18.6	0.5	0.0	3.0	1685.1	2.6	0	0
11/24/2020 13:30	8	1	18.6	0.4	0.0	2.7	1684.3	2.6	0	0
11/24/2020 13:31	8	1	18.5	0.4	0.0	2.3	1683.9	2.6	0	0
11/24/2020 13:32	8	1	18.6	0.3	0.0	1.8	1680.6	2.6	0	0
11/24/2020 13:33	8	1	18.6	0.3	0.0	1.8	1680.9	2.6	0	0
11/24/2020 13:34	8	1	18.7	0.3	0.0	2.0	1674.0	2.6	0	0
11/24/2020 13:35	8	1	18.7	0.4	0.0	2.3	1670.8	2.5	0	0
11/24/2020 13:36	8	1	18.6	0.3	0.0	1.9	1669.0	2.5	0	0
11/24/2020 13:37	8	1	18.6	0.3	0.0	1.8	1673.9	2.5	0	0
11/24/2020 13:38	8	1	18.6	0.3	0.0	2.0	1679.9	2.5	0	0
11/24/2020 13:39	8	1	18.5	0.4	0.0	2.3	1676.0	2.6	0	0
11/24/2020 13:40	8	1	18.7	0.4	0.0	2.5	1665.2	2.6	0	0
11/24/2020 13:41	8	1	18.6	0.4	0.0	2.4	1657.5	2.6	0	0
11/24/2020 13:42	8	1	18.7	0.4	0.0	2.5	1649.4	2.5	0	0
11/24/2020 13:43	8	1	18.6	0.4	0.0	2.4	1643.9	2.5	0	0
11/24/2020 13:44	8	1	18.6	0.4	0.0	2.4	1654.5	2.6	0	0
11/24/2020 13:45	8	1	18.5	0.3	0.0	1.8	1667.0	2.5	0	0
11/24/2020 13:46	8	1	18.5	0.3	0.0	1.9	1669.3	2.5	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
11/24/2020 13:47	8	1	18.6	0.4	0.0	2.4	1671.0	2.5	0	0
11/24/2020 13:48	8	1	18.5	0.4	0.0	2.3	1673.1	2.6	0	0
11/24/2020 13:49	8	1	18.6	0.4	0.0	2.3	1661.4	2.6	0	0
11/24/2020 13:50	8	1	18.6	0.4	0.0	2.2	1665.6	2.6	0	0
11/24/2020 13:51	8	1	18.6	0.4	0.0	2.4	1662.6	2.6	0	0
11/24/2020 13:52	8	1	18.5	0.4	0.0	2.2	1681.6	2.5	0	0
11/24/2020 13:53	8	1	18.5	0.3	0.0	1.7	1679.1	2.5	0	0
11/24/2020 13:54	8	1	18.5	0.3	0.0	1.7	1687.8	2.5	0	0
11/24/2020 13:55	8	1	18.5	0.4	0.0	2.2	1676.1	2.5	0	0
11/24/2020 13:56	8	1	18.6	0.4	0.0	2.2	1665.4	2.5	0	0
11/24/2020 13:57	8	1	18.7	0.3	0.0	1.9	1653.6	2.5	0	0
11/24/2020 13:58	8	1	18.6	0.3	0.0	1.7	1655.2	2.5	0	0
11/24/2020 13:59	8	1	18.7	0.2	0.0	1.3	1651.1	2.5	0	0
11/24/2020 14:00	8	1	18.5	0.2	0.0	1.2	1674.5	2.6	0	0

DATE-TIME	PROCESS CODE	SOURCE ON (MINS)	DRY O2 (%)	DRY CO (PPM)	CO2 (%)	CO @ 7% (PPM)	AFTERBURNER TEMPERATURE (DEG F)	DUST COLLECTOR DP (IN H2O)	MOISTURE (PPM)	DAS DOWN (MINS)
AVERAGE			18.6	0.4	0.0	2.7	1682.4	2.6	0	
TOTAL		67								0
MIN VALUE			18.4	0.2	0.0	1.2	1643.9	2.5	0	
MIN TIME			13:09	13:59	12:54	14:00	13:43	13:06	12:54	
MIN DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	
MAX VALUE			18.7	0.9	0.0	5.5	1717.2	2.6	0	
MAX TIME			13:59	13:23	14:00	13:23	13:09	14:00	14:00	
MAX DATE			11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	11/24/2020	

APPENDIX E: CALIBRATIONS AND CERTIFICATIONS

ED_005878_00000192-00105

STAC STACK TESTING ACCREDITATION COUNCIL

A2LA American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

BISON ENGINEERING, INC.

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 15th day of January 2020.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4675.01
Valid to November 30, 2021

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

METERBOX CALIBRATION FORM
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Box Number	8
Console Serial Number	
DGM Model Number	Itron
DGM Serial Number	028-040611-1

Calibration Conditions			
Date	Time	14-Sep-20	11:00
Barometric Pressure		27.45	in Hg
Theoretical Critical Vacuum[1]		12.96	in Hg
Calibration Technician		LCE	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	oR/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 * {}^oR^{1/2})/(in.Hg*min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	0.29	113.727	116.850	82	83	SX-40	0.2307	79	80	23
10.0	0.59	84.685	89.161	79	80	SX-48	0.3304	77	77	22
10.0	1.05	89.161	95.150	80	80	SX-55	0.4429	77	78	20
10.0	1.70	95.150	102.980	81	82	SX-63	0.5791	78	79	19
10.0	3.30	102.980	113.727	82	82	SX-73	0.7993	79	79	16

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
2.791	0.279	2.726	0.273	0.977	0.003	0.273	1.964	0.047
4.025	0.403	3.914	0.391	0.972	-0.002	0.391	1.953	0.035
5.388	0.539	5.243	0.524	0.973	-0.001	0.524	1.939	0.022
7.036	0.704	6.852	0.685	0.974	0.000	0.685	1.840	-0.078
9.690	0.969	9.451	0.945	0.975	0.001	0.945	1.892	-0.026
Pre-test Y	0.978	% Deviation	PASS	0.974	Y Average		1.918	ΔH@ Average

AVERAGE Y= 0.974

AVERAGE ΔH= 1.918

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
Note: For Calibration Factor H, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.20.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature Louis Connor Everly Date 9/14/2020

Y:\SOURCE\Calibration\BLANK CALIBRATION FORMS\High Flow Meterbox Calibration_Critical Oriface

METERBOX CALIBRATION FORM
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Box Number	8
Console Serial Number	
DGM Model Number	Itron
DGM Serial Number	028-040611-1

Calibration Conditions			
Date	Time	30-Nov-20	12:34
Barometric Pressure		27.48	in Hg
Theoretical Critical Vacuum[1]		12.97	in Hg
Calibration Technician		LCE	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	oR/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^{3*}{}^{o}R^{1/2})/(in.Hg*min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	0.29	275.850	278.940	71	72	SX-40	0.2344	70	71	22
10.0	0.58	284.090	288.538	72	73	SX-48	0.3361	71	71	21
10.0	1.04	288.538	294.497	73	74	SX-55	0.4513	71	72	20
10.0	1.60	294.497	302.295	74	74	SX-63	0.5899	72	72	18
10.3	3.30	302.295	313.244	74	74	SX-73	0.8124	72	72	15

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
2.822	0.282	2.797	0.280	0.991	0.002	0.280	1.907	0.084
4.057	0.406	4.008	0.401	0.988	-0.002	0.401	1.856	0.034
5.432	0.543	5.380	0.538	0.991	0.001	0.538	1.849	0.026
7.112	0.711	7.031	0.703	0.989	-0.001	0.703	1.669	-0.154
10.031	0.977	9.938	0.968	0.991	0.001	0.968	1.832	0.010
Pre-test Y	0.974	% Deviation	PASS	0.990	Y Average		1.823	ΔH@ Average

AVERAGE Y= 0.990

AVERAGE ΔH= 1.823

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
Note: For Calibration Factor H, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.20.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature Louis Connor Everly Date 11/30/2020

Y:\SOURCE\Calibration\BLANK CALIBRATION FORMS\High Flow Meterbox Calibration_Critical Oriface

BISON ENGINEERING. INC.

Field Barometer Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CALIBRATION

Reference Standard Used:

Standard ID	Serial number	Adjusted on:	Calibration due:
Tucson Mercury Barometer	TUC01	11/20/2020	Must be properly adjusted prior to every use

Field Barometer Verification:

Barometer ID: B1

Reference Value (in Hg)	Observed (in Hg)	Correction*	Tolerance (+/- 0.1 in Hg)**
27.58	27.51	-0.07	PASS

*Correction is the difference between the observed and reference values

**EPA Method 5, Section 6.1.2 and EPA Method 2, Section 6.5.

Technician: LCE

Date: 11/20/2020

Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined
Version: 7/30/2019

BISON ENGINEERING, INC.

Field Balance and Weights Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CHECKS

Date: 11/20/2020
Performed by: LCE

Environmental conditions in the lab:

Temperature °F	Pressure "Hg
76	27.51

Reference Standard(s) Used:

Standard ID	Serial number(s)	Calibrated on:	Calibration due:
Troemner	4000021445	7/23/2020	7/23/2021

Verification of Field Balance Against Reference Standard Weights:

Balance ID: WSS-1

Nominal Value (g)	Observed (g)	Correction*	Tolerance (+/- 0.5g)**
200	200.0	0.0	PASS
500	500.0	0.0	PASS
1000	1000.0	0.0	PASS
2000	2000.1	0.1	PASS

Verification of Field Standard Weights :

Weights ID: B200, B500

Nominal Value (g)	Observed (g)	Correction*	Tolerance (+/- 0.5g)**
200	200.0	0.0	PASS
500	500.0	0.0	PASS
1000	1000.1	0.1	PASS
2000	2000.0	0.0	PASS

*Correction is the difference between the observed and nominal mass values
**EPA Method 5, Section 6.3.4

Page 1 of 2

ONSITE BALANCE VERIFICATION

Date: 11/24/2020
Performed by: LCE

Environmental conditions onsite:

Temperature °F	Pressure "Hg
64	27.31

Field Balance Verification:
Balance ID: WSS-1
Weights ID: B200, B500

Nominal Value (g)	Observed (g)	Correction*	PASS/FAIL Tolerance (+/- 0.5g)
500	500.0	0.0	PASS
200	200.0	0.0	PASS
1000	1000.1	0.1	PASS
2000	2000.4	0.4	PASS

*Correction is the difference between the observed and nominal mass values

Technician: LCE

Date: 11/24/2020

Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined
Version: 7/30/2019 Page 2 of 2

BISON ENGINEERING, INC.

Field Caliper Calibration Form

Project #: TIM220419

IN OFFICE PRE-TEST CHECKS

Date: 11/20/2020
Performed by: LCE

Reference Standard Used:

Standard ID	Serial number	Calibrated on:	Calibration due:
Mitutoyo	A17170739	1/14/2020	1/14/2021

Caliper Verification:
Field Caliper ID: TMC-2
Inside Diameter

Reference Value (inches)	Observed (inches)	Correction*	Tolerance (+/- 0.0050 inch)
0.140	0.143	0.003	PASS

*Correction is the difference between the observed and reference values

Outside Diameter

Reference Value (inches)	Observed (inches)	Correction*	Tolerance (+/- 0.0050 inch)
0.250	0.251	0.001	PASS

*Correction is the difference between the observed and reference values

Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined
Version: 7/30/2019

BISON ENGINEERING, INC.

Thermocouple Calibration Form

Project #: TIM220419

POST-TEST CHECKS

Reference Standard Used:

Standard ID	Serial number(s)	Calibrated on:	Calibration due:
Omega	T289858	6/11/2020	6/11/2021

Temperature Meter Mode:

Thermocouple ID	Continuity (x = pass)	Observed Temp (°F)	Reference Temp (°F)	Correction*	Tolerance (+/- 2°F)**
Stack Temp (T-4-2)	x	76.7	77.5	0.8	PASS
Probe Liner (T-4-2)	x	75.6		1.9	PASS
Hot Box (HB-1)	x	78.6		1.1	PASS
Condenser (1966)	x	79.4		1.9	PASS
Condenser (GN7)	x	79.2		1.7	PASS
Condenser (3197)	x	78.9		1.4	PASS
Box 8 DGM Outlet	x	78.8		1.3	PASS
Box 8 DGM Inlet (If applicable)	x	78.9		1.4	PASS

Calibration Output Mode:

Switch the Omega from 'Meter Input' to 'Calibration Output' mode. Test the meter box temperature readout by sending a voltage output equivalent to a temperature similar to stack temperature.

Meter Box ID	Reference Temp Output (°F)	Meter Box Readout (°F)	Correction*	Tolerance (+/- 2°F)**
SB-4 (Box 8)	77.8	78	0.2	PASS

*Correction is the difference between the observed and reference values
**Alt-011 6/21/94 Alternative Method 2 Thermocouple Calibration Procedure:
Continuity Check - confirm the thermocouple is reading at the tip by subjecting it to a change in temperature (e.g. removing it from the stack, or touching it with a your hand).
Single-point temperature check at ambient temperature, or any temperature, within the range specified by the manufacturer.

Technician: LCE

Date: 11/25/2020

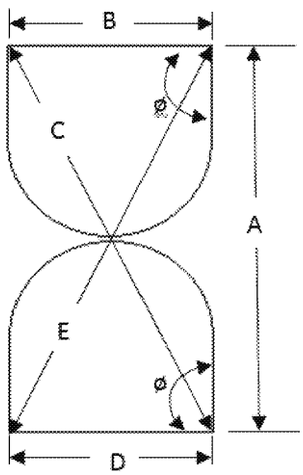
Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined
Version: 7/30/2019

BISON ENGINEERING, INC.

S-Type Pitot Tube Geometric Calibration

Pitot ID: T-PT-4 (T-4-2)

Date of Geometric Calibration (< 6 months): 9/3/2020



A	0.909
B	0.386
C	0.967
D	0.383
E	0.978

$$\frac{a^2 + b^2 - c^2}{2ab} = \cos \emptyset$$

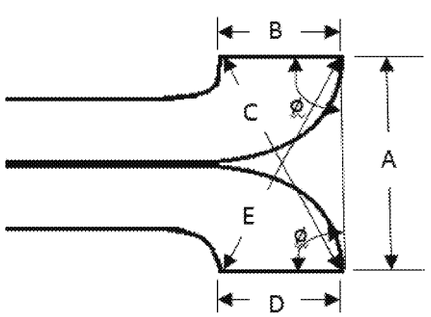
$$\frac{a^2 + d^2 - e^2}{2ad} = \cos \emptyset$$

ø	86.72

$(80° < \emptyset < 100°)$

ø	88.64

$(80° < \emptyset < 100°)$



A	0.9125
B	0.4265
C	1.031
D	0.4275
E	1.0325

$$\frac{a^2 + b^2 - c^2}{2ab} = \cos \emptyset$$

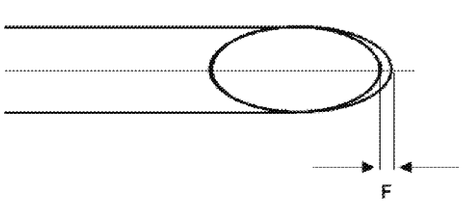
$$\frac{a^2 + d^2 - e^2}{2ad} = \cos \emptyset$$

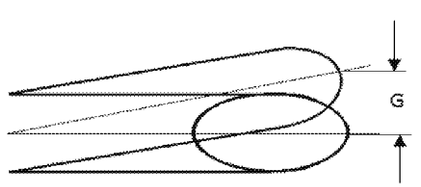
ø	93.57

$(85° < \emptyset < 95°)$

ø	93.72

$(85° < \emptyset < 95°)$





F=	0.00

(F < 0.125)

G=	0.00

(G < 0.032)

Results of the Post-Test Pitot Inspection (mark with x below):

No change x

Damaged _____

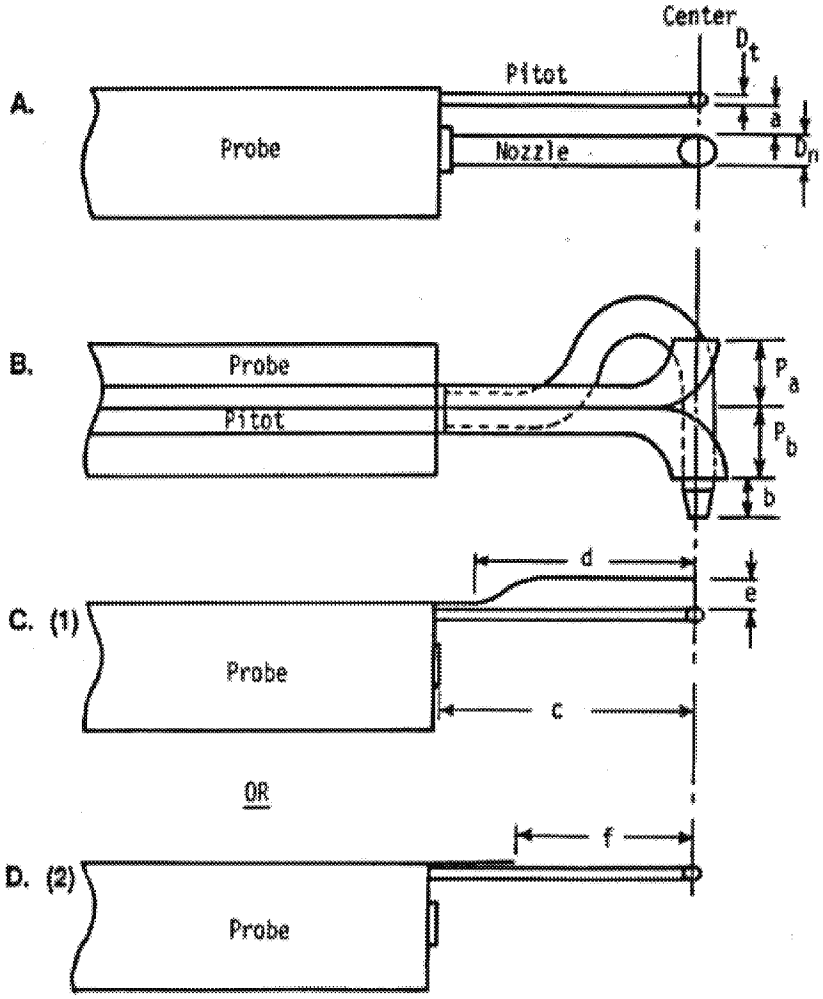
New Calibration _____

Technician: LCE **Date:** 11/30/2020

Probe Calibration

Probe ID: T-4-2

Date of calibration (< 6 months): 9/3/2020



		Measure (Inch)
Dt:	3/8	Dt = 0.187 to 0.375
Dn:	1/2	Dn = 0.5
a:	1	a ≥ 0.750
Pa:	3/7	Pa = Pb
Pb:	3/7	
b:	4/9	B ≥ 0
c:	4	c ≥ 3.0
d:	4 7/9	d ≥ 3.0
e:	3/5	e ≥ 0.750
or		
f:		f ≥ 2.0

Results of the Post-Test Probe Inspection (mark with x below):

No change ____x____

Damaged _____

New Calibration _____

Technician: LCE **Date:** 11/30/2020

Y:\SOURCE\Calibrations\BLANK CALIBRATION FORMS\Calibration Form Combined
Version: 7/30/2019

PRAXAIR
Making our planet more productive

DocNumber: 301951

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG PHOENIX AZ HS
3918 W LINCOLN ST
PHOENIX AZ 85009-5414

Certificate Issuance Date: 03/13/2020
Praxair Order Number: 71272082
Part Number: EV NICDOXE103AS
Customer PO Number: 79261417

Fill Date: 03/05/2020
Lot Number: 70086006502
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/13/2028	NIST Traceable
Cylinder Number:	CC505870	Expanded Uncertainty
9.96 %	Carbon dioxide	± 0.5 %
10.02 %	Oxygen	± 0.5 %
Balance	Nitrogen	

Certification Information:

Certification Date: 03/13/2020 *Term:* 96 Months *Expiration Date:* 03/13/2028

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

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Carbon dioxide**

Requested Concentration: 10 %
Certified Concentration: 9.96 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 02/24/2020

First Analysis Data:							Date	03/13/2020
Z:	0	R:	16.02	C:	9.96		Conc:	9.96
R:	16.02	Z:	0	C:	9.96		Conc:	9.96
Z:	0	C:	9.96	R:	16.02		Conc:	9.96
UOM:	%					Mean Test Assay:		9.96 %

Reference Standard: Type / Cylinder #: GMIS / CC79405
Concentration / Uncertainty: 16.02 % ±0.277%
Expiration Date: 07/10/2022
Traceable to: SRM # / Sample # / Cylinder #: SRM 1675b / 6-F-51 / CAL014538
SRM Concentration / Uncertainty: 13.963% / ±0.034%
SRM Expiration Date: 05/16/2022

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: 10 %
Certified Concentration: 10.02 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 02/24/2020

First Analysis Data:							Date	03/13/2020
Z:	0	R:	9.88	C:	10.04		Conc:	10.03
R:	9.9	Z:	0	C:	10.03		Conc:	10.02
Z:	0	C:	10.03	R:	9.88		Conc:	10.02
UOM:	%					Mean Test Assay:		10.02 %

Reference Standard: Type / Cylinder #: NTRM / DT0010287
Concentration / Uncertainty: 9.875 % ±0.4%
Expiration Date: 11/18/2022
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 170701 / NTRM DT0010287
SRM Concentration / Uncertainty: 9.875 % / ±0.040%
SRM Expiration Date: 11/18/2022

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 Jenna Lockman

Certified By Jose Vasquez

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. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR
Making our planet more productive

DocNumber: 301952

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

PRAXAIR PKG PHOENIX AZ HS
3918 W LINCOLN ST
PHOENIX AZ 85009-5414

Certificate Issuance Date: 03/13/2020
Praxair Order Number: 71272082
Part Number: NI CD20O15E-AS
Customer PO Number: 79261417

Fill Date: 03/05/2020
Lot Number: 70086006503
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/13/2028	NIST Traceable
Cylinder Number:	DT0029914	Expanded Uncertainty
19.86 %	Carbon dioxide	± 0.4 %
19.96 %	Oxygen	± 0.2 %
Balance	Nitrogen	

Certification Information:

Certification Date: 03/13/2020 *Term:* 96 Months *Expiration Date:* 03/13/2028

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.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** Carbon dioxide

Requested Concentration: 20 %
Certified Concentration: 19.86 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 02/24/2020

First Analysis Data:							Date	03/13/2020
Z:	0	R:	19.92	C:	19.86	Conc:	19.85	
R:	19.94	Z:	0	C:	19.88	Conc:	19.87	
Z:	0	C:	19.88	R:	19.94	Conc:	19.87	
UOM:	%				Mean Test Assay:		19.86	%

Reference Standard: Type / Cylinder #: GMIS / CC188344
Concentration / Uncertainty: 19.92 % ±0.296%
Expiration Date: 02/20/2028
Traceable to: SRM # / Sample # / Cylinder #: RGM#CC28033 / N/A / RGM#CC28033
SRM Concentration / Uncertainty: 19.67% / ±0.04%
SRM Expiration Date: 07/15/2021

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:			%

2. ***Component:*** Oxygen

Requested Concentration: 20 %
Certified Concentration: 19.96 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 02/24/2020

First Analysis Data:							Date	03/13/2020
Z:	0	R:	20.88	C:	19.97	Conc:	19.97	
R:	20.88	Z:	0	C:	19.97	Conc:	19.97	
Z:	0	C:	19.93	R:	20.86	Conc:	19.93	
UOM:	%				Mean Test Assay:		19.96	%

Reference Standard: Type / Cylinder #: GMIS / CC707388
Concentration / Uncertainty: 20.87 % ±0.108%
Expiration Date: 12/14/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 2658a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
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 Jenna Lockman

Certified By Jose Vasquez

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. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

This is the last page
of the report.

ED_005878_00000192-00118