



EUSHAKEOUT PM Emissions Test Report

Prepared for:

Metal Technologies, Inc.

Auburn, IN

Metal Technologies, Inc.
1401 S Grandstaff Dr
Auburn, IN 46706

Test Location:
Metal Technologies Inc.
429 Fourth Street
Three Rivers, MI 49093

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APR 21 2015

AIR QUALITY DIV.

Project No. 15-4655.00
April 15, 2015

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

**RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION**

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name Metal Technologies, Inc. - Three Rivers Gray Iron County St. Joseph

Source Address 429 4th Street City Three Rivers

AQD Source ID (SRN) B2015 ROP No. B2015-2013c ROP Section No. C

Please check the appropriate box(es):

Annual Compliance Certification (Pursuant to Rule 213(4)(c))

Reporting period (provide inclusive dates): From _____ To _____

1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))

Reporting period (provide inclusive dates): From _____ To _____

1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification

Reporting period (provide inclusive dates): From _____ To _____

Additional monitoring reports or other applicable documents required by the ROP are attached as described:
Testing was conducted in accordance with the approved test plan and the facility _____
operating conditions were in compliance with permit requirements or were at maximum _____
operating conditions for the facility. _____

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Doug Monroe President 269-278-1765
Name of Responsible Official (print or type) Title Phone Number

Douglas Monroe 4/15/2015
Signature of Responsible Official Date

* Photocopy this form as needed.



EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by Three Rivers Gray Iron (TRG) to evaluate Particulate Matter emissions from EUSHAKEOUT, which is collected by the 2014 North Dostar baghouse, and vented to SV2014NDUSTAR location at the facility in Three Rivers, Michigan. The purpose of the test program was to show compliance with Michigan ROP-B2015-2013c, which limits PM from the EUSHAKEOUT to 11.9 lbs/hr and 0.04 lbs/1000 lbs exhaust gas, dry.

As stated in the test plan, BTEC measured filterable and condensable PM. TRG is required to test to show compliance with the above state particulate emission limitations by 10/17/2018. TRG is also required to test PM, PM₁₀, & PM_{2.5} to verify emissions resulting from the installation of the new 2014 North Dostar do not exceed PSD permitting thresholds. Both requirements were tested during this round of testing. USEPA Method 5 was used for PM determination, and USEPA Methods 5 & 202 were used for PM₁₀ and PM_{2.5} determinations. Had the results for PM₁₀ and/or PM_{2.5} come back at or above the thresholds, additional testing, using appropriate methods would have been conducted to show that actual levels were below the thresholds.

Testing consisted of triplicate 60-minute test runs. Sampling and analysis for the emission test program was conducted on February 26th, 2015. The results of this test program are summarized by the following table.

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**Table I
Test Program Summary**

Source	Permit Limitation Emission Rate	Average PM Emission Rate
EUSHAKEOUT	11.9 lbs/hr	1.72 lbs/hr
	0.04 lbs/1000 lbs exhaust gas, dry	0.006 lbs/1000 lbs exhaust gas, dry

**Table II
PSD Threshold Comparison**

	Tons/Yr	PSD Threshold	Notes
PM	1.3545	25	1,2
PM ₁₀	6.4715	15	2,3
PM _{2.5}	6.4715	10	2,3

1 -PM-filterable (Method 5)

2 -7,525 hrs used as noted in the permit application as the max theoretical hours per year

3 -PM-filterable + condensable (Methods 5 and 202)



1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Three Rivers Gray Iron (TRG) to evaluate Particulate Matter emissions from EUSHAKEOUT, which is collected by the 2014 North Duster baghouse, and vented to SV2014NDUSTAR location at the facility in Three Rivers, Michigan. The purpose of the test program was to show compliance with Michigan ROP-B2015-2013c, which limits PM from the EUSHAKEOUT to 11.9 lbs/hr and 0.04 lbs/1000 lbs exhaust gas, dry. Testing was completed on February 26th, 2015. The purpose of this document is to document the results of the test program.

The Air Quality Division (AQD) of Michigan's Department of Environmental Quality has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (December 2013). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on February 26th, 2015 for the EUSHAKEOUT at the facility in Three Rivers, Michigan. The test program included evaluation of PM emissions.

1.b Purpose of Testing

The purpose of the testing is to show that the EUSHAKEOUT are in compliance with Michigan ROP-B2015-2013c. PM emission rate (in terms of pounds per hour) was verified with the Process at normal operating conditions.

1.c Source Description

Metal Technologies, Inc., Three Rivers Gray Iron Plant (Facility), is located in the city of Three Rivers, St. Joseph County, Michigan. The Facility is located in an industrial zoned area with the nearest house located 400 feet east to northeast of the facility. The Facility is a gray iron foundry that melts iron in four electric induction furnaces. Each induction furnace is equipped with a smoke ring and all four furnaces share a common baghouse. Metal is poured into green sand molds to produce castings. Acid scrubbers control the core making process. Castings are conveyed to a didion rotary shakeout machine to remove sand, which is controlled by a baghouse. Wheelabrator shotblast machines, grinders, and other miscellaneous finishing processes are controlled by a baghouse.

1.d Test Program Contact

The contact for information regarding the test program as well as the test report is as follows:

Mr. Dan Plant
Corporate Engineering Manager
Metal Technologies, Inc.
1401 S Grandstaff Dr
Auburn, IN 46706
260-920-2137

Mr. Barry P. Boulianne
Senior Project Manager
BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, MI 48073
313-449-2361

1.e Testing Personnel

Names and affiliations for all personnel who were present during the testing program are summarized by Table 1.

Table 1
Testing Personnel

Name	Affiliation
Matthew Young	BTEC
Paul Diven	BTEC
Dan Plant	MTI
David Patterson	MDEQ
Rex Lane	MDEQ

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions test program.

2.a Operating Data

Operating data monitored include a differential pressure gauge, which is monitored and maintained between 2-8".

2.b Applicable Permit

MI-ROP-B2015-2013c.

2.c Results

MI-ROP-B2015-2013c limits PM from EUSHAKEOUT process equipment to 11.9 lbs/hr. The average PM emission rate from the EUSHAKEOUT was 1.72 lbs/hr. See Table 2 for a detailed summary of PM emissions including all the runs.

2.d Emission Regulation Comparison

The results summarized by Tables 2 show that the PM emissions are below the limits summarized by section 1.b.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

Shakeout machine and associated equipment that separate iron castings to casting transfer, sand to the sand system, and sprue to the scrap bay.

3.b Process Flow Diagram

Due to the simplicity of the process, a process flow diagram is not necessary.

3.c Raw and Finished Materials

Raw Material used includes iron.

3.d Process Capacity

TRG monitors Iron throughput to maintain compliance with its ROP. 2014's average hourly iron throughput equaled 24.1 ton/hour.

PRODUCTION LEVEL

	Run 1	Run 2	Run 3	Comments
Date	2/26/2015	2/26/2015	2/26/2015	
Time	9:06-11:24	12:58-14:40	15:48-17:01	
Average Tons Metal Charged Per Hour	24.1	24.1	24.1	Based on 12 month period from 3/14 to 2/15
Tons Metal Charged Per Hour	26.9	26.7	26.6	

3.e Process Instrumentation

Operating/melt production rate in tons/hr, and the North Dostar Baghouse differential pressure readings from maintenance logs for 1/26/15 through 2/26/15.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures that were used to test for PM emissions.

4.a Sampling Train and Field Procedures

To evaluate PM mass emission rates, BTEC utilized the following reference test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations:

- Method 1 - *“Sample and Velocity Traverses for Stationary Sources”*
- Method 2 - *“Determination of Stack Gas Velocity and Volumetric Flowrate”*
- Method 3 - *“Gas Analysis for the Determination of Dry Molecular Weight” (Fyrite Analysis)*
- Method 4 - *“Determination of Moisture Content in Stack Gases”*
- Method 5 - *“Determination of Particulate Emissions from Stationary Sources”*
- Method 202 - *“Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources”*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Methods 1 and 2. Figure 1 presents the test port and traverse/sampling point locations used. An S-type pitot tube and thermocouple assembly calibrated in accordance with Method 2, Section 4.1.1 was used to measure exhaust gas velocity pressures and temperatures during testing. Because the pitot tube dimensions outlined in Sections 2-6 through 2-8 were within the specified limits, the baseline pitot tube coefficient of 0.84 (dimensionless) was assigned for this testing.

Molecular weight determinations were conducted according to Method 3. The equipment used for this evaluation consisted of a one-way squeeze bulb with connecting tubing and a set of Fyrite[®] combustion gas analyzers. Moisture content was determined from the condensate collected in the Method 5 sampling train according to Method 4.

40 CFR 60, Appendix A, Method 5 and 202, "*Determination of Particulate Emissions from Stationary Sources*", and "*Dry Impinger Method for Determining Condensable Particulate Matter*" was used to measure PM concentrations and calculate PM emission rates (see Figure 2 for a schematic of the sampling train). Triplicate 60-minute test runs were conducted on the EUSHAKOUT exhaust stack.

BTEC's Nutech[®] Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless steel nozzle, (2) a steel probe with borosilicate glass liner, (3) a heated filter holder, (4) a vertical condenser, (5) an empty pot bellied impinger, (6) an empty modified Greenburg-Smith (GS) impinger, (7) unheated filter holder with a teflon filter, (8) a second modified GS impinger with 100 ml of deionized water, and a third modified GS impinger containing approximately 300 g of silica gel desiccant, (9) a length of sample line, and (10) a Nutech[®] control case equipped with a pump, dry gas meter, and calibrated orifice.

A sampling train leak test was conducted before and after each test run. After completion of the final leak test for each test run, the filter was recovered, and the nozzle and the front half of the filter holder assembly were brushed and triple rinsed with acetone. The acetone rinses were collected in a pre-cleaned sample container. The impinger train was purged with nitrogen for one hour at a flow rate of 14 liters per minute. The CPM filter was recovered and placed in a petri dish. The back half of the filter housing, the condenser, the pot bellied impinger, the moisture drop out impinger, and the front half of the CPM filter housing and all connecting glassware were double rinsed with HPLC deionized water which was collected in a pre-cleaned sample container. The same glassware was then rinsed with acetone which was collected in a pre-cleaned sample container labeled as the organic fraction. The glassware was then double rinsed with hexane which was added to the same organic fraction sample bottle.

BTEC labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. In addition, blank samples of the acetone, DI water, hexane, and filter were collected. BTEC personnel carried all samples to BTEC's laboratory (for filter and acetone gravimetric analysis) in Royal Oak, Michigan. The M202 samples were transported to Bureau Veritas laboratory in Novi, Michigan for analysis.

4.b Recovery and Analytical Procedures

Recovery and analytical procedures were described in Section 4.a.

4.c Sampling Ports

Sampling port and traverse point locations for the EUSHAKEOUT exhaust stack are illustrated by Figure 1.

4.d Traverse Points

Sampling port and traverse point locations for the EUSHAKEOUT exhaust stack are illustrated by Figure 1.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The results of the test program are summarized by Table 2.

5.b Discussion of Results

MI-ROP-B2015-2013c limits PM from EUSHAKEOUT process equipment to 11.9 lbs/hr. The average PM emission rate from the EUSHAKEOUT was 1.72 lbs/hr. See Table 2 for a detailed summary of PM emissions including all the runs.

The laboratory internal method blank for Method 202 had a positive value of 5.7 μg in the organic condensable fraction which results in a positive bias in the results. The maximum allowable blank correction of 2 μg was subtracted from the results and the emission rate of each test is well under applicable limits.

5.c Sampling Procedure Variations

No sampling procedure variations were used during testing.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

No maintenance was performed during the test program.

5.f Re-Test Changes

The test program performed was not previously performed.



5.g Audit Sample Analyses

Audit samples were not applicable to this test program.

5.h Calibration Sheets

Relevant equipment calibration documents are provided as Appendix B.

5.i Sample Calculations

Sample calculations are provided as Appendix C.

5.j Field Data Sheets

Copies of field data sheets and relevant field notes are provided in Appendix A.

5.k Laboratory Data

Laboratory Data is provided in Appendix D

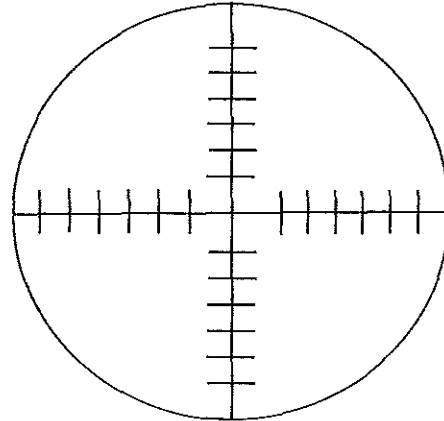
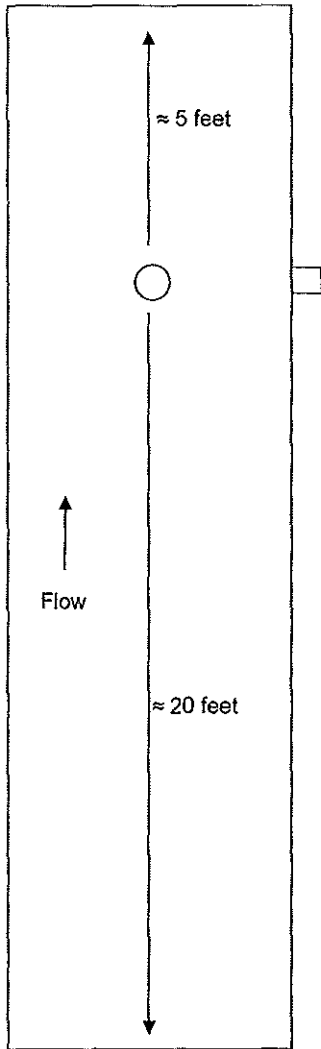
Table 2
EUSHAKEOUT Particulate Matter Emission Rates

Company Source Designation Test Date	Metal Technologies (TRG) EUSHAKEOUT			Average
	2/26/2015	2/26/2015	2/26/2015	
Meter/Nozzle Information				
Meter Temperature Tm (F)	62.0	67.9	68.5	66.1
Meter Pressure - Pm (in. Hg)	29.4	29.4	29.5	29.4
Measured Sample Volume (Vm)	57.1	57.7	61.4	58.7
Sample Volume (Vm-Std ft3)	56.2	56.1	59.7	57.3
Sample Volume (Vm-Std m3)	1.59	1.59	1.69	1.62
Condensate Volume (Vw-std)	2.249	2.108	1.971	2.109
Gas Density (Ps(std) lbs/ft3) (wet)	0.0735	0.0735	0.0736	0.0735
Gas Density (Ps(std) lbs/ft3) (dry)	0.0745	0.0745	0.0745	0.0745
Total weight of sampled gas (m g lbs) (wet)	4.29	4.28	4.54	4.37
Total weight of sampled gas (m g lbs) (dry)	4.19	4.18	4.45	4.27
Nozzle Size - An (sq. ft.)	0.000309	0.000309	0.000309	0.000309
Isokinetic Variation - I	93.8	96.6	97.2	95.9
Stack Data				
Average Stack Temperature - Ts (F)	89.5	93.1	91.5	91.3
Molecular Weight Stack Gas- dry (Md)	28.8	28.8	28.8	28.8
Molecular Weight Stack Gas-wet (Ms)	28.4	28.4	28.5	28.5
Stack Gas Specific Gravity (Gs)	0.981	0.982	0.984	0.982
Percent Moisture (Bws)	3.85	3.62	3.20	3.56
Water Vapor Volume (fraction)	0.0385	0.0362	0.0320	0.0356
Pressure - Ps ("Hg)	29.2	29.2	29.2	29.2
Average Stack Velocity - Vs (ft/sec)	59.6	58.1	61.0	59.6
Area of Stack (ft2)	19.6	19.6	19.6	19.6
Exhaust Gas Flowrate				
Flowrate ft ³ (Actual)	70,220	68,423	71,834	70,159
Flowrate ft ³ (Standard Wet)	65,897	63,790	67,162	65,616
Flowrate ft ³ (Standard Dry)	63,359	61,481	65,014	63,285
Flowrate m ³ (standard dry)	1,794	1,741	1,841	1,792
Total Particulate Weights (mg)				
Total Nozzle/Probe/Filter	1.4	2.5	3.4	2.4
Organic Condensable Particulate	7.4	11.0	6.5	8.3
Inorganic Condensable Particulate	3.1	2.7	3.2	3.0
Condensable Blank Correction	2.0	2.0	2.0	2.0
Total Condensable Particulate	8.5	11.7	7.7	9.3
Total Filterable and Condensable Particulate	9.9	14.2	11.1	11.7
Filterable Particulate Concentration				
lb/1000 lb (wet)	0.001	0.001	0.002	0.001
lb/1000 lb (dry)	0.001	0.001	0.002	0.001
mg/dscm (dry)	0.9	1.6	2.0	1.5
gr/dscf	0.0004	0.0007	0.0009	0.0007
Filterable Particulate Emission Rate				
lb/ hr	0.21	0.36	0.49	0.36
Condensable Particulate Concentration				
lb/1000 lb (wet)	0.004	0.006	0.004	0.005
lb/1000 lb (dry)	0.004	0.006	0.004	0.005
mg/dscm (dry)	5.3	7.4	4.6	5.8
gr/dscf	0.0023	0.0032	0.0020	0.0025
Condensable Particulate Emission Rate				
lb/ hr	1.27	1.70	1.11	1.36
Total Particulate Concentration				
lb/1000 lb (wet)	0.005	0.007	0.005	0.006
lb/1000 lb (dry)	0.005	0.007	0.006	0.006
mg/dscm (dry)	6.2	8.9	6.6	7.2
gr/dscf	0.0027	0.0039	0.0029	0.0032
Total Particulate Emission Rate				
lb/ hr	1.48	2.07	1.61	1.72

Figures



diameter = 60 inches



Not to Scale

Points	Distance "
1	1.3
2	4.0
3	7.1
4	10.6
5	15.0
6	21.4
7	38.6
8	45.0
9	49.4
10	52.9
11	56.0
12	58.7

Figure No. 1

Site:
EUSHAKEOUT
Metal Technologies, Inc.
Three Rivers, Michigan

Sampling Date:
February 26, 2015

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073

BTEC Inc.

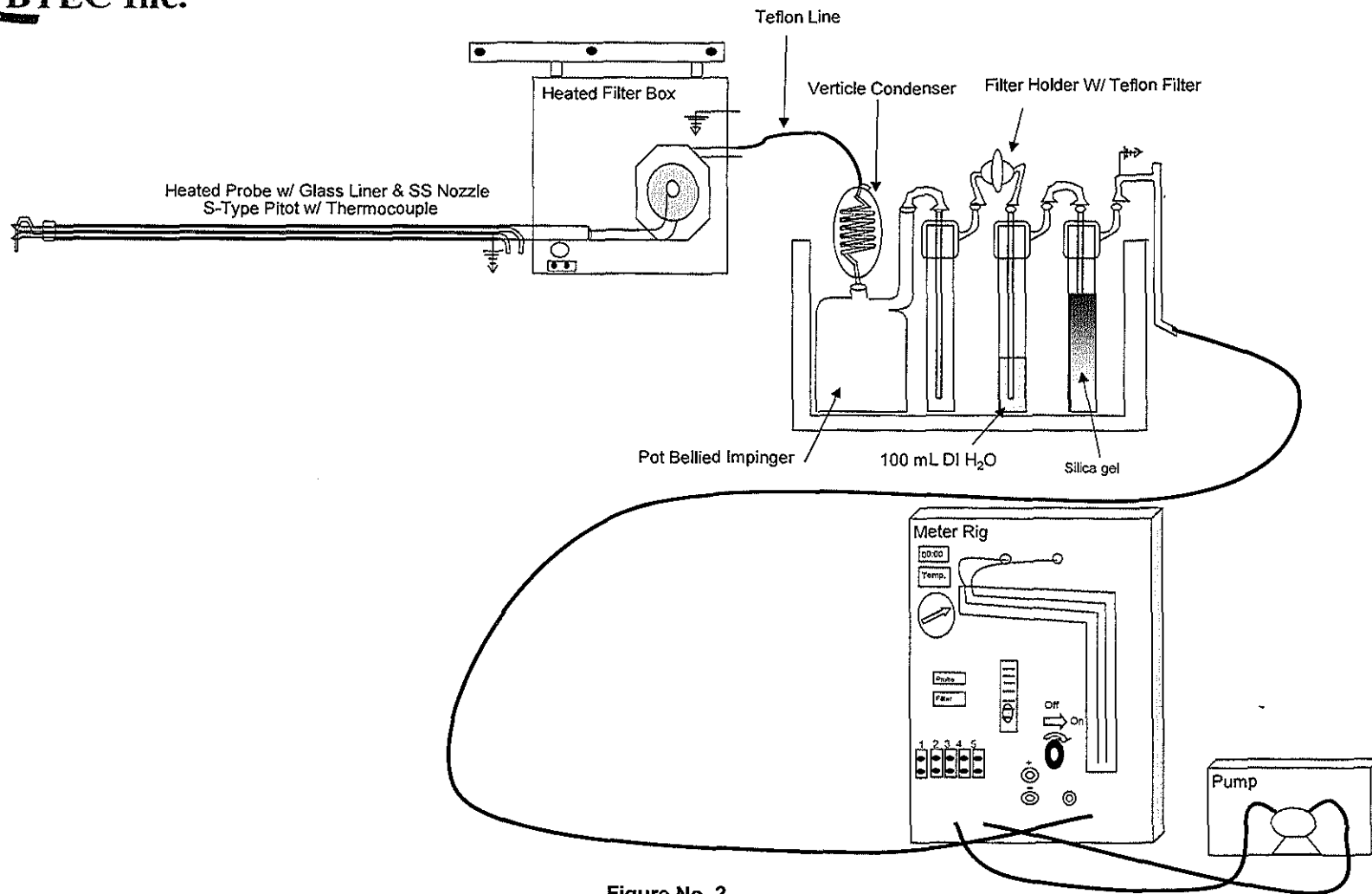


Figure No. 2

Site:
USEPA Method 5/202
Metal Technologies, Inc.
Three Rivers, Michigan

Sampling Date:
February 26, 2015

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073