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EMISSIONS TESTING REPORT #13003  
Text and Appendices

PERFORMED FOR:

Detroit Renewable Power, LLC  
Detroit, Michigan

at the

Detroit Renewable Power, LLC  
Detroit, Michigan  
Units 11, 12, and 13 Stacks  
November 2013


by

TESTAR Engineering, P.C.  
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Raleigh, North Carolina 27617  
License Number C-3896  
919/957-9500

**PE CERTIFICATION  
REPORT 13003**

I hereby certify that I have personally examined and am familiar with the information submitted herein. Based upon my own knowledge and my inquiry of those individuals responsible for obtaining the information presented, the foregoing information is true, accurate and complete. I am aware that this information is being requested for the purpose of determining compliance with local, state, and federal laws and may be submitted to appropriate governmental regulatory agencies for those purposes. I am aware that there are significant penalties for submitting false information to such agencies, including the possibility of fine and imprisonment.

Signature

  
\_\_\_\_\_  
Gary L. Williams, PE, QSTI  
Director

Date:

1/10/14

Professional Engineer, State of Michigan

Seal Number 6201049658

# TABLE OF CONTENTS

	<u>PAGE</u>
1 Introduction .....	1-1
1.1 General.....	1-1
1.2 Test Personnel .....	1-1
1.3 Test Parameters and Run Numbers.....	1-2
2 Summary of Results.....	2-1
2.1 Report Organization .....	2-1
2.2 Presentation of Results .....	2-1
2.3 Total Hydrocarbon Data .....	2-1
2.4 Dioxins/Furans Results and EMPC Values .....	2-1
2.5 Metals Reagent Blank Corrections.....	2-1
2.6 Aborted Test Run .....	2-5
2.7 Fugitive Emissions Results .....	2-5
2.8 Opacity Results .....	2-5
2.9 Facility CEM Data.....	2-5
2.10 Duplicate Analyses.....	2-5
2.11 Non-detected Values.....	2-5
3 Process Description and Operation .....	3-1
4 Sampling and Analytical Methods.....	4-1
4.1 EPA Methods 1-4 – Air Flow Rate and Moisture.....	4-1
4.2 EPA M13B/CARB M425 – Total Fluorides and Hexavalent Chromium .....	4-1
4.3 EPA Method 22 – Fugitive Emissions .....	4-5
4.4 EPA Method 23/Alternate Method 052 – Dioxins/Furans.....	4-5
4.5 EPA Methods 3A and 25A – CEM Parameters.....	4-5
4.6 EPA Modified Method 26 – Hydrogen Chloride.....	4-6
4.7 EPA Method 29 – Particulate and Metals.....	4-7
5 QA/QC Results.....	5-1
5.1 QA/QC Policy Procedures.....	5-1
5.2 Sample Custody and Preservation.....	5-1
5.3 Sample Blanks, Duplicates, and Matrix Spikes .....	5-2
5.4 Data Validation and Presentation.....	5-2
5.5 QA/QC Results.....	5-2
 Appendices:	
A. Test Results.....	1
A.1 Unit 11 Stack, Dioxins/Furans .....	2
A.2 Unit 11 Stack, Hydrogen Chloride .....	12
A.3 Unit 11 Stack, Particulate and Metals.....	14
A.4 Unit 11 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	17
A.5 Unit 11 Stack, Total Hydrocarbons.....	19
A.6 Unit 12 Stack, Dioxins/Furans .....	24
A.7 Unit 12 Stack, Hydrogen Chloride .....	34
A.8 Unit 12 Stack, Particulate and Metals.....	36
A.9 Unit 12 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	39
A.10 Unit 12 Stack, Total Hydrocarbons.....	41
A.11 Unit 13 Stack, Dioxins/Furans .....	46
A.12 Unit 13 Stack, Hydrogen Chloride .....	55
A.13 Unit 13 Stack, Particulate and Metals.....	57
A.14 Unit 13 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	60
A.15 Unit 13 Stack, Total Hydrocarbons.....	62
A.16 Example Calculations .....	67

- continued on next page -

# TABLE OF CONTENTS

- continued -

Appendices:	PAGE
B. Field Data.....	73
B.1 Unit 11 Stack, Dioxins/Furans .....	74
B.2 Unit 11 Stack, Hydrogen Chloride .....	84
B.3 Unit 11 Stack, Particulate and Metals.....	89
B.4 Unit 11 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	94
B.5 Unit 11 Stack, Total Hydrocarbons.....	100
B.6 Unit 12 Stack, Dioxins/Furans .....	121
B.7 Unit 12 Stack, Hydrogen Chloride .....	130
B.8 Unit 12 Stack, Particulate and Metals.....	135
B.9 Unit 12 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	141
B.10 Unit 12 Stack, Total Hydrocarbons.....	146
B.11 Unit 13 Stack, Dioxins/Furans .....	168
B.12 Unit 13 Stack, Hydrogen Chloride .....	175
B.13 Unit 13 Stack, Particulate and Metals.....	180
B.14 Unit 13 Stack, Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium .....	184
B.15 Unit 13 Stack, Total Hydrocarbons.....	190
B.16 Ash Handling System, Fugitive Emissions .....	211
B.17 Facility CEMS and COMS Data.....	215
C. Analytical Data.....	227
C.1 Dioxins/Furans .....	228
C.2 Hydrogen Chloride .....	280
C.3 Particulate and Metals.....	324
C.4 Total Fluorides as Hydrogen Fluoride and Hexavalent Chromium.....	422
D. Calibration Data .....	463
E. Data Sheets of Aborted Test Runs .....	482

# LIST OF TABLES AND FIGURES

## TABLES

Table 1-1 Test Personnel.....	1-1
Table 1-2 Unit 11 Test Sequence.....	1-2
Table 1-3 Unit 12 Test Sequence.....	1-3
Table 1-4 Unit 13 Test Sequence.....	1-4
Table 1-5 Utilization of EPA Method 2 and 3 Data.....	1-5
Table 2-1 Unit 11 Summary of Emissions.....	2-2
Table 2-2 Unit 12 Summary of Emissions.....	2-3
Table 2-3 Unit 13 Summary of Emissions.....	2-4
Table 5-1 Summary of QA/QC Procedures.....	5-3
Table 5-2 Performance Audit Results.....	5-4

## FIGURES

Figure 4-1 Stack Test Locations Schematic.....	4-2
Figure 4-2 Process Shredder Primary Stack Test Locations Schematic.....	4-3
Figure 4-3 Process Shredder Secondary Stack Test Locations Schematic.....	4-4

# 1 INTRODUCTION

## 1.1 General

Detroit Renewable Power, LLC operates the Detroit Renewable Power, LLC facility in Detroit, Michigan. Detroit Renewable Power, LLC contracted TESTAR Engineering, P. C. to conduct an air emissions testing program to quantify specific emissions from Units 11, 12, and 13 for determining compliance status. The testing program was conducted between November 04 and 14, 2013 by TESTAR Engineering under the supervision of Mr. Bill Alexander of Detroit Renewable Power, LLC.

## 1.2 Test Personnel

Table 1-1 presents the personnel that were involved in the testing program.

**Table 1-1  
Test Personnel**

Affiliation	Personnel Responsibility
Detroit Renewable Power, LLC	Bill Alexander Test Coordinator
Michigan Department of Environmental Quality	Remilando Pinga Test Observer
	Thomas Maza Test Observer
TESTAR Engineering, P. C.	Herb Dixon, PE Project Director
	Blake Cone Field Laboratory Technician
	David Brintie CEM Engineer
	Phil Juneau CEM Engineer
	Jeff Alms Test Engineer
	Sean Daley Test Engineer
	Eddie King Test Engineer
	Charles Nahrebecki Test Engineer

**1.3 Test Parameters and Run Numbers**

Tables 1-2, 1-3, and 1-4 present the test dates, sampling locations, flue gas parameters, sampling methods, and run numbers for reference.

**Table 1-2  
 Unit 11 Test Sequence**

Test Location	Sampling Method	Flue Gas Parameter	Run Date	Run Time	Run Number
Unit 11 Stack	EPA M23	Dioxins/Furans	11/08/13	0811-1230	11-S-M23-1
			11/09/13	0930-1339	11-S-M23-2
			11/09/13	1343-1752	11-S-M23-3
	EPA MM26	Hydrogen Chloride	11/07/13	0944-1044	11-S-MM26-1
			11/07/13	1133-1233	11-S-MM26-2
			11/07/13	1305-1411	11-S-MM26-3
	EPA 29	Particulate and Metals	11/08/13	0916-1131	11-S-M29-1
			11/09/13	1030-1239	11-S-M29-2
			11/09/13	1443-1652	11-S-M29-3
EPA 13B/ CARB 425	Total Fluorides as HF and Hexavalent Chromium	11/07/13	0943-1151	11-S-M13B/425-1	
		11/07/13	1209-1422	11-S-M13B/425-2	
		11/07/13	1423-1711	11-S-M13B/425-3	
EPA 25A	Total Hydrocarbons	11/06/13	0955-1122	11-S-CEM-1,2,3	
		11/06/13	1130-1246	11-S-CEM-4,5,6	
		11/06/13	1254-1410	11-S-CEM-7,8,9	
Facility COMS	Opacity	11/08/13	1000-1100	11-S-COM-1	
		11/09/13	1100-1200	11-S-COM-2	
		11/09/13	1500-1600	11-S-COM-3	
Ash Handling System	EPA M22	Fugitive Emissions	11/14/13	1020-1130	M22-1
			11/14/13	1230-1340	M22-2
			11/15/13	0950-1100	M22-3

Table 1-3  
 Unit 12 Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Run Date	Run Time	Run Number
Unit 12 Stack	EPA M23	Dioxins/Furans	11/16/13	0747-1152	12-S-M23-1
			11/16/13	1155-1600	12-S-M23-2
			11/16/13	1604-2010	12-S-M23-3
	EPA MM26	Hydrogen Chloride	11/15/13	0819-0919	12-S-MM26-1
			11/15/13	0927-1027	12-S-MM26-2
			11/15/13	1054-1154	12-S-MM26-3
	EPA 29	Particulate and Metals	11/15/13	0818-1026	12-S-M29-1
			11/15/13	1053-1258	12-S-M29-2
			11/15/13	1317-1523	12-S-M29-3
	EPA 13B/ CARB 425	Total Fluorides as HF and Hexavalent Chromium	11/16/13	0849-1056	12-S-M13B/425-1
			11/16/13	1257-1502	12-S-M13B/425-2
			11/16/13	1704-1912	12-S-M13B/425-3
	EPA 25A	Total Hydrocarbons	11/14/13	0815-1026	12-S-CEM-1,2,3
			11/14/13	1042-1212	12-S-CEM-4,5,6
			11/14/13	1225-1352	12-S-CEM-7,8,9
	Facility COMS	Opacity	11/15/13	0900-1000	12-S-COM-1
			11/15/13	1100-1200	12-S-COM-2
			11/15/13	1400-1500	12-S-COM-3



Table 1-4  
 Unit 13 Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Run Date	Run Time	Run Number
Unit 13 Stack	EPA M23	Dioxins/Furans	11/17/13	0752-1158	13-S-M23-1
			11/17/13	1201-1608	13-S-M23-2
	EPA MM26	Hydrogen Chloride	11/08/13	1256-1356	13-S-MM26-1
			11/08/13	1400-1500	13-S-MM26-2
			11/08/13	1530-1630	13-S-MM26-3
	EPA 29	Particulate and Metals	11/17/13	0854-1103	13-S-M29-1
			11/17/13	1301-1511	13-S-M29-2
	EPA 13B/ CARB 425	Total Fluorides as HF and Hexavalent Chromium	11/08/13	0811-1016	13-S-M13B/425-1
			11/08/13	1129-1334	13-S-M13B/425-2
			11/08/13	1346-1630	13-S-M13B/425-3
	EPA 25A	Total Hydrocarbons	11/07/13	0908-1031	13-S-CEM-1,2,3
			11/07/13	1038-1155	13-S-CEM-4,5,6
			11/07/13	1202-1319	13-S-CEM-7,8,9
	Facility COMS	Opacity	11/17/13	0900-1000	13-S-COM-1
			11/17/13	1400-1500	13-S-COM-2

Table 1-5  
 Utilization of EPA Method 2 and 3 Data

Runs Requiring Additional Information	Runs Providing Air Flow Rate Data	Runs Providing Flue Gas Composition Data
11-S-MM26-1	NA	11-S-M13B/425-1
11-S-MM26-2	NA	11-S-M13B/425-1 & 2
11-S-MM26-3	NA	11-S-M13B/425-2
11-S-M29-1	11-S-M29-1	11-S-M23-1
11-S-M29-2	11-S-M29-2	11-S-M23-2
11-S-M29-3	11-S-M29-3	11-S-M23-3
11-S-CEM-1,2,3	11-S-M2-1,2,3	11-S-CEM-1,2,3
11-S-CEM-4,5,6	11-S-M2-4,5,6	11-S-CEM-4,5,6
11-S-CEM-7,8,9	11-S-M2-7,8,9	11-S-CEM-7,8,9
12-S-MM26-1	NA	12-S-M29-1
12-S-MM26-2	NA	12-S-M29-1
12-S-MM26-3	NA	12-S-M29-2
12-S-M13B/425-1	12-S-M13B/425-1	12-S-M23-1
12-S-M13B/425-2	12-S-M13B/425-2	12-S-M23-2
12-S-M13B/425-3	12-S-M13B/425-3	12-S-M23-3
12-S-CEM-1,2,3	12-S-M2-1,2,3	12-S-CEM-1,2,3
12-S-CEM-4,5,6	12-S-M2-4,5,6	12-S-CEM-4,5,6
12-S-CEM-7,8,9	12-S-M2-7,8,9	12-S-CEM-7,8,9
13-S-MM26-1	NA	13-S-M13B/425-2
13-S-MM26-2	NA	13-S-M13B/425-3
13-S-MM26-3	NA	13-S-M13B/425-3
13-S-M29-1	13-S-M29-1	13-S-M23-1
13-S-M29-2	13-S-M29-2	13-S-M23-2
13-S-CEM-1,2,3	13-S-M2-1,2,3	13-S-CEM-1,2,3
13-S-CEM-4,5,6	13-S-M2-4,5,6	13-S-CEM-4,5,6
13-S-CEM-7,8,9	13-S-M2-7,8,9	13-S-CEM-7,8,9

## **2 SUMMARY OF RESULTS**

### **2.1 Report Organization**

The results of the testing project are summarized in Section 2. The process tested is discussed in Section 3. The sampling and analytical methods utilized are discussed in Section 4 while the Quality Assurance/Quality Control results are presented in Section 5. Appendix A contains detailed results of the testing program. Appendix B contains the field data that was collected and Appendix C contains the analytical results. Appendix D contains all pertinent testing equipment calibration data. Refer to the Table of Contents and the List of Tables and Figures for a complete reference with appropriate page numbers.

### **2.2 Presentation of Results**

Table 2-1 presents the results of the emissions testing project for Unit 12. Table 2-2 presents the results of the emissions testing project for Unit 13. A more detailed summary of the sampling gas parameters is presented in Appendix A.

### **2.3 Total Hydrocarbon Data**

Continuous Emissions Monitoring (CEM) data for total hydrocarbons was provided by the reference method CEMS. Three 21-minute test runs were combined to represent one 60-minute THC test run.

### **2.4 Dioxins/Furans Results and EMPC Values**

In accordance with EPA Method 23, Section 9.9, all dioxins/furans results that were below the minimum detection limit (ND) were treated as zero when averaging or totaling the results. All dioxins/furans results that were an estimated maximum possible concentration (EMPC) are presented using the EMPC value as a positive catch when calculating the results.

### **2.5 Metals Reagent Blank Corrections**

Chromium and lead were detected at low levels in the reagent blank. In accordance with EPA Method 29, Sections 12.6 and 12.7, the test run catch weights were corrected for the blank values. Chromium and lead results are presented in Appendix A.

Table 2-1  
 Unit 11 Summary of Emissions

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
<b>Unit 11 Stack Concentrations, @ 7%O2</b>					
Carbon monoxide, ppm <sup>1</sup>	72	---	---	72	200
Carbon monoxide, ppm <sup>2</sup>	148	121	221	163	267
Dioxins/Furans, ng/DSCM	11.4	8.30	8.20	9.32	30
Hex. Chromium, ug/DSCM	< 0.124	< 0.103	< 0.109	< 0.112	4.2
Hydrogen Chloride, ppm	5.69	4.37	5.84	5.30	25
Mercury, ug/DSCM	3.60	3.92	3.34	3.62	50
<b>Metals</b>					
Cadmium, ug/DSCM	1.49	1.00	1.24	1.24	35
Chromium, ug/DSCM	10.8	6.83	7.85	8.50	200
Lead, mg/DSCM	0.0270	0.0263	0.0227	0.0253	0.400
Nitrogen oxides, ppm <sup>2</sup>	203	206	195	201	247
Particulate, Gr/DSCF	0.00824	0.00746	0.00732	0.00767	0.010
Sulfur dioxide, ppm <sup>3</sup>	15	---	---	15	29
Total Fluorides as HF, ppm	0.130	< 0.102	< 0.102	< 0.111	5
Total Hydrocarbons, ppm	6.29	5.22	2.50	4.67	65
<b>Unit 11 Stack</b>					
Opacity, %	0.1	0.2	0.2	0.2	10

<sup>1</sup> - 24 hour average.

<sup>2</sup> - Three 1 hour averages.

<sup>3</sup> - 24 hour geometric mean.

Table 2-2  
 Unit 12 Summary of Emissions

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
<b>Unit 12 Stack Concentrations, @ 7%O2</b>					
Carbon monoxide, ppm <sup>1</sup>	56	---	---	56	200
Carbon monoxide, ppm <sup>2</sup>	30	37	35	34	267
Dioxins/Furans, ng/DSCM	16.5	16.4	15.4	16.1	30
Hex. Chromium, ug/DSCM	< 0.0951	< 0.103	< 0.0978	< 0.0986	4.2
Hydrogen Chloride, ppm	3.86	3.67	3.73	3.75	25
Mercury, ug/DSCM	2.89	3.47	3.30	3.22	50
<b>Metals</b>					
Cadmium, ug/DSCM	0.320	0.266	0.261	0.282	35
Chromium, ug/DSCM	1.65	1.21	1.57	1.47	200
Lead, mg/DSCM	0.00283	0.00320	0.00319	0.00307	0.400
Nitrogen oxides, ppm <sup>2</sup>	215	210	213	213	247
Particulate, Gr/DSCF	0.000357	0.000332	0.000126	0.000272	0.010
Sulfur dioxide, ppm <sup>3</sup>	12	---	---	12	29
Total Fluorides as HF, ppm	< 0.0715	< 0.0727	< 0.0726	< 0.0723	5
Total Hydrocarbons, ppm	3.51	2.93	3.02	3.15	65
<b>Unit 12 Stack</b>					
Opacity, %	0	0	0	0	10

- <sup>1</sup> - 24 hour average.
- <sup>2</sup> - Three 1 hour averages.
- <sup>3</sup> - 24 hour geometric mean.

Table 2-3  
 Unit 13 Summary of Emissions

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
<b>Unit 13 Stack Concentrations, @ 7%O<sub>2</sub></b>					
Carbon monoxide, ppm <sup>1</sup>	52	---	---	52	200
Carbon monoxide, ppm <sup>2</sup>	42	27	96	55	267
Dioxins/Furans, ng/DSCM	4.97	5.06	---	5.02	30
Hex. Chromium, ug/DSCM	< 0.103	< 0.109	< 0.095	< 0.103	4.2
Hydrogen Chloride, ppm	8.21	7.86	6.02	7.36	25
Mercury, ug/DSCM	2.49	2.25	---	2.37	50
<b>Metals</b>					
Cadmium, ug/DSCM	0.461	0.401	---	0.431	35
Chromium, ug/DSCM	2.70	2.31	---	2.50	200
Lead, mg/DSCM	0.0107	0.0102	---	0.0105	0.400
Nitrogen oxides, ppm <sup>2</sup>	196	209	203	203	247
Particulate, Gr/DSCF	0.00115	0.00144	---	0.00129	0.010
Sulfur dioxide, ppm <sup>3</sup>	22	---	---	22	29
Total Fluorides as HF, ppm	< 0.0914	< 0.0937	< 0.0941	< 0.0931	5
Total Hydrocarbons, ppm	4.20	5.79	4.56	4.85	65
<b>Unit 13 Stack</b>					
Opacity, %	1	1	---	1	10

- <sup>1</sup> - 24 hour average.  
<sup>2</sup> - Three 1 hour averages.  
<sup>3</sup> - 24 hour geometric mean.

## **2.6 Aborted Test Run**

Test runs 13-S-M23-3 and 13-M29-3 could not be completed because a lightning strike shut down the facility one hour into the test runs. A replacement test set could not be performed because the facility was shut down for several days. Due to this situation being beyond the control of the test firm or the facility, only the first two test runs of EPA Method 23 and EPA Method 29 (13-S-M23-1, 13-S-M23-2, 13-M29-1, and 13-M29-2) were used in determining compliance status for Unit 13 dioxins/furans, particulate, cadmium, chromium, lead, and mercury per 40CFR60.8(f). Mr. Thomas Maza of Michigan Department of Environmental Quality approved using two test runs as the facility average rather than usual three test run average. The data sheets for these test runs are included in Appendix E.

## **2.7 Fugitive Emissions Results**

Three EPA Method 22 test runs were performed for fugitive emissions on the ash handling system. No fugitive emissions results are presented in Appendix A because all values were zero. The field data sheets are located in Appendix B.

## **2.8 Opacity Results**

Opacity was quantified utilizing the facility's Continuous Opacity Monitoring (COM) monitors per 40CFR 60.11 (e) (5) on each stack. The facility COMS data is located in Appendix B.

## **2.9 Facility CEM Data**

The facility CEMS were utilized for the sulfur dioxide, nitrogen oxides, and carbon monoxide concentrations. The facility data was provided in 1 hour and 24 hour averages as necessary. This data is contained in Appendix B.

## **2.10 Duplicate Analyses**

Runs 11-S-M29-2, 12-S-M29-2, and 13-S-M29-2 were analyzed in duplicate for metals. All samples for mercury were analyzed in duplicate. All samples for hydrogen chloride were analyzed in duplicate. The average of the duplicate analyses were used for reporting purposes.

## **2.11 Non-detected Values**

The results are presented using a worst-case scenario. All non-detected results were used as values for calculation purposes and the result is preceded by a "<" symbol. All non-detected

results were used as a zero when calculating total catch weights for samples that had both a positive catch weight for one or more fractions and also non-detected fraction(s). When averaging across a set of three test runs, non-detected results were treated as values. Any average result that includes a non-detected value includes a "<" symbol in front of the result.



Table 5-1  
 Summary of QA/QC Procedures

Test Method	QA/QC Procedure	QA/QC Objective	QA/QC Results	Status of QA/QC
EPA M13B	HF Reagent Blank	ND	< 0.1 mg	Acceptable
	Duplicate RPD	≤ 20 %	NA %	Acceptable
	Spike Recovery	90 - 110%	98 - 100 %	Acceptable
CARB M425	Duplicate RPD	≤ 20 %	NA %	Acceptable
	NaOH Reagent Blank	ND	< 0.054 ug	Acceptable
	Spike Recovery	90 - 110%	97 - 100 %	Acceptable
EPA M23	Internal Standard Recoveries (4-6)	40 - 130 %	74.2 - 96.9 %	Acceptable
	Internal Standard Recoveries (7-8)	25 - 130 %	69.5 - 92 %	Acceptable
	Surrogate Standard Recoveries	70 - 130 %	89.2 - 107 %	Acceptable
EPA MM26	HCl Reagent Blank	ND	< 0.087 mg	Acceptable
	HCl Spike	90 - 110 %	101.4 %	Acceptable
	HCl Internal Audit	≤ 10 %	- 2.94 %	Acceptable
EPA M5/29	Acetone Blank	< 1.0E-05 mg/mg	1.65E-05 mg/mg 7.60E-06 mg/mg	Acceptable, no blank correction
EPA M29	Duplicate RPD	≤ 20 %	0 - 5.3 %	Acceptable
Cadmium	Reagent Blank	NA	< 0.2, < 0.2 ug	Acceptable
Chromium	Reagent Blank	NA	1.22, 3.57 ug	Acceptable, blank correction
Lead	Reagent Blank	NA	0.380, < 0.2 ug	Acceptable, blank correction
Metals	Spike Recoveries	75 - 125 %	86 - 118 %	Acceptable
Mercury	Reagent Blank	NA	< 0.5 ug	Acceptable
Mercury	Duplicate RPD	≤ 20 %	0 - 1.2 %	Acceptable
Mercury	Spike Recoveries	75 - 125 %	90 - 109 %	Acceptable

Table 5-2  
 Performance Audit Results

Test Method	Audit ID	QA/QC Objective	QA/QC Results	Status of QA/QC
EPA M13B - Fluoride	Audit 110513O, Cat No. 1441, Solution	$\pm 15 \%$	6.00 ug/ml	Acceptable
EPA M26 - Hydrogen Chloride	Audit 110513O, Cat No. 1440, Solution	$\pm 10 \%$	16.0 mg/L	Acceptable
EPA M29 - Mercury	Audit 110513P, Cat No. 1427, Filter	$\pm 25 \%$	4.90 ug	Acceptable
EPA M29 - Mercury	Audit 110513P, Cat No. 1428, Solution	$\pm 25 \%$	25.4 ng/mL	Acceptable
EPA M29 - Cadmium	Audit 110513P, Cat No. 1425, Filter	$\pm 20 \%$	40.1 ug/filter	Acceptable
EPA M29 - Chromium	Audit 110513P, Cat No. 1425, Filter	$\pm 20 \%$	39.6 ug/filter	Acceptable
EPA M29 - Lead	Audit 110513P, Cat No. 1425, Filter	$\pm 20 \%$	89.5 ug/filter	Acceptable
EPA M29 - Cadmium	Audit 110513P, Cat No. 1426, Solution	$\pm 20 \%$	0.219 ug/mL	Acceptable
EPA M29 - Chromium	Audit 110513P, Cat No. 1426, Solution	$\pm 20 \%$	0.231 ug/mL	Acceptable
EPA M29 - Lead	Audit 110513P, Cat No. 1426, Solution	$\pm 25 \%$	1.44 ug/mL	Acceptable