TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

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TestAmerica Job ID: 240-43288-1
Client Project/Site: Abandoned Mining Waste-Torch Lake

For:
Michigan Dept of Environmental Quality
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Attn: Amy Keranen

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Authorized for release by:
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Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
F1	MS and/or MSD Recovery exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 240-43288-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Michigan Dept of Environmental Quality

Project: Abandoned Mining Waste-Torch Lake

Report Number: 240-43288-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

All parameters were evaluated to the method detection limit and include qualified results where applicable.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The sample was received on 10/18/2014 9:30 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8º C.

TCLP VOLATILE ORGANIC COMPOUNDS (GCMS)

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for TCLP volatile organic compounds (GCMS) in accordance with EPA SW-846 Methods 1311/8260B. The samples were leached on 10/21/2014 and analyzed on 10/22/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP METALS (ICP)

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for TCLP metals (ICP) in accordance with EPA SW-846 Methods 1311/6010B. The samples were leached on 10/21/2014, prepared on 10/22/2014 and analyzed on 10/23/2014.

Barium and Chromium were detected in method blank LB 240-152646/1-B at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

Job ID: 240-43288-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

Lead failed the recovery criteria low for the MS of sample CHLL-DRUMWC-101514MS (240-43288-1) in batch 240-152967.

Refer to the QC report for details.

Sample CHLL-DRUMWC-101514 (240-43288-1)[100X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP MERCURY

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for TCLP mercury in accordance with EPA SW-846 Methods 1311/7470A. The samples were leached on 10/21/2014, prepared on 10/22/2014 and analyzed on 10/25/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL CYANIDE

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for total cyanide in accordance with EPA SW-846 Method 9012A. The samples were prepared and analyzed on 10/22/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SULFIDE

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for sulfide in accordance with EPA SW-846 Method 9034. The samples were prepared and analyzed on 10/22/2014.

Sulfide failed the recovery criteria low for the MS/MSD of sample CHLL-DRUMWC-101514MS/MSD (240-43288-1) in batch 240-152784. Refer to the QC report for details.

The matrix spike/matrix spike duplicate (MS/MSD) recoveries for batch 152784 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS

Sample CHLL-DRUMWC-101514 (240-43288-1) was analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 10/21/2014.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL CAN
6010B	Metals (ICP)	SW846	TAL CAN
7470A	Mercury (CVAA)	SW846	TAL CAN
9012A	Cyanide, Total and/or Amenable	SW846	TAL CAN
9034	Sulfide, Acid soluble and Insoluble (Titrimetric)	SW846	TAL CAN
Moisture	Percent Moisture	EPA	TAL CAN

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-43288-1	CHLL-DRUMWC-101514	Solid	10/15/14 15:50	10/18/14 09:30

Detection Summary

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Client Sample ID: CHLL-DRUMWC-101514 **Lab Sample ID: 240-43288-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0076	J	0.50	0.0029	mg/L	1		6010B	TCLP
Barium	27	B	10	0.10	mg/L	100		6010B	TCLP
Cadmium	0.070	J	0.10	0.00014	mg/L	1		6010B	TCLP
Chromium	0.0018	J B	0.50	0.00055	mg/L	1		6010B	TCLP
Lead	800		50	0.19	mg/L	100		6010B	TCLP
Selenium	0.0077	J	0.25	0.0040	mg/L	1		6010B	TCLP
Silver	0.0036	J	0.50	0.00092	mg/L	1		6010B	TCLP

This Detection Summary does not include radiochemical test results.

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Client Sample ID: CHLL-DRUMWC-101514
Date Collected: 10/15/14 15:50
Date Received: 10/18/14 09:30

Lab Sample ID: 240-43288-1
Matrix: Solid

Method: 8260B - Volatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.025	0.0095	mg/L			10/22/14 18:12	1
1,2-Dichloroethane	ND		0.025	0.011	mg/L			10/22/14 18:12	1
2-Butanone (MEK)	ND		0.25	0.029	mg/L			10/22/14 18:12	1
Benzene	ND		0.025	0.0065	mg/L			10/22/14 18:12	1
Carbon tetrachloride	ND		0.025	0.0065	mg/L			10/22/14 18:12	1
Chlorobenzene	ND		0.025	0.0075	mg/L			10/22/14 18:12	1
Chloroform	ND		0.025	0.0080	mg/L			10/22/14 18:12	1
Tetrachloroethene	ND		0.025	0.015	mg/L			10/22/14 18:12	1
Trichloroethene	ND		0.025	0.0085	mg/L			10/22/14 18:12	1
Vinyl chloride	ND		0.025	0.011	mg/L			10/22/14 18:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*92*		*80 - 121*		*10/22/14 18:12*	*1*
4-Bromofluorobenzene (Surr)	*78*		*70 - 124*		*10/22/14 18:12*	*1*
Toluene-d8 (Surr)	*86*		*80 - 120*		*10/22/14 18:12*	*1*
Dibromofluoromethane (Surr)	*89*		*80 - 128*		*10/22/14 18:12*	*1*

Method: 6010B - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0076**	**J**	0.50	0.0029	mg/L		10/22/14 10:06	10/23/14 12:03	1
Barium	**27**	**B**	10	0.10	mg/L		10/22/14 10:06	10/23/14 15:54	100
Cadmium	**0.070**	**J**	0.10	0.00014	mg/L		10/22/14 10:06	10/23/14 12:03	1
Chromium	**0.0018**	**J B**	0.50	0.00055	mg/L		10/22/14 10:06	10/23/14 12:03	1
Lead	**800**		50	0.19	mg/L		10/22/14 10:06	10/23/14 15:54	100
Selenium	**0.0077**	**J**	0.25	0.0040	mg/L		10/22/14 10:06	10/23/14 12:03	1
Silver	**0.0036**	**J**	0.50	0.00092	mg/L		10/22/14 10:06	10/23/14 12:03	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	0.000090	mg/L		10/22/14 10:12	10/25/14 11:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.60	0.36	mg/Kg	☼	10/22/14 11:11	10/22/14 13:39	1
Sulfide	ND		36	27	mg/Kg	☼	10/22/14 07:53	10/22/14 07:53	1
Percent Solids	**83**		0.10	0.10	%			10/21/14 09:17	1
Percent Moisture	**17**		0.10	0.10	%			10/21/14 09:17	1

Surrogate Summary

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(80-121)	(70-124)	(80-120)	(80-128)
LCS 240-152831/8	Lab Control Sample	93	84	92	90

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)
DBFM = Dibromofluoromethane (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		12DCE	BFB	TOL	DBFM
Lab Sample ID	Client Sample ID	(80-121)	(70-124)	(80-120)	(80-128)
240-43288-1	CHLL-DRUMWC-101514	92	78	86	89
LB 240-152648/1-A MB	Method Blank	96	81	88	92

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)
DBFM = Dibromofluoromethane (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: LCS 240-152831/8
Matrix: Solid
Analysis Batch: 152831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1-Dichloroethene	1.00	0.994		mg/L		99	71 - 133
1,2-Dichloroethane	1.00	1.06		mg/L		106	80 - 120
2-Butanone (MEK)	2.00	1.84		mg/L		92	49 - 120
Benzene	1.00	1.08		mg/L		108	80 - 120
Carbon tetrachloride	1.00	0.899		mg/L		90	54 - 122
Chlorobenzene	1.00	0.984		mg/L		98	80 - 120
Chloroform	1.00	1.05		mg/L		105	80 - 123
Tetrachloroethene	1.00	0.959		mg/L		96	79 - 134
Trichloroethene	1.00	1.08		mg/L		108	78 - 130
Vinyl chloride	1.00	0.900		mg/L		90	56 - 120

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*93*		*80 - 121*
4-Bromofluorobenzene (Surr)	*84*		*70 - 124*
Toluene-d8 (Surr)	*92*		*80 - 120*
Dibromofluoromethane (Surr)	*90*		*80 - 128*

Lab Sample ID: LB 240-152648/1-A MB
Matrix: Solid
Analysis Batch: 152831

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	ND		0.025	0.0095	mg/L			10/22/14 17:27	1
1,2-Dichloroethane	ND		0.025	0.011	mg/L			10/22/14 17:27	1
2-Butanone (MEK)	ND		0.25	0.029	mg/L			10/22/14 17:27	1
Benzene	ND		0.025	0.0065	mg/L			10/22/14 17:27	1
Carbon tetrachloride	ND		0.025	0.0065	mg/L			10/22/14 17:27	1
Chlorobenzene	ND		0.025	0.0075	mg/L			10/22/14 17:27	1
Chloroform	ND		0.025	0.0080	mg/L			10/22/14 17:27	1
Tetrachloroethene	ND		0.025	0.015	mg/L			10/22/14 17:27	1
Trichloroethene	ND		0.025	0.0085	mg/L			10/22/14 17:27	1
Vinyl chloride	ND		0.025	0.011	mg/L			10/22/14 17:27	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*96*		*80 - 121*		*10/22/14 17:27*	*1*
4-Bromofluorobenzene (Surr)	*81*		*70 - 124*		*10/22/14 17:27*	*1*
Toluene-d8 (Surr)	*88*		*80 - 120*		*10/22/14 17:27*	*1*
Dibromofluoromethane (Surr)	*92*		*80 - 128*		*10/22/14 17:27*	*1*

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-152752/2-A
Matrix: Solid
Analysis Batch: 152967

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 152752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.0029	mg/L		10/22/14 10:06	10/23/14 11:47	1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: MB 240-152752/2-A
Matrix: Solid
Analysis Batch: 152967

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 152752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.10	0.0010	mg/L		10/22/14 10:06	10/23/14 11:47	1
Cadmium	ND		0.10	0.00014	mg/L		10/22/14 10:06	10/23/14 11:47	1
Chromium	ND		0.50	0.00055	mg/L		10/22/14 10:06	10/23/14 11:47	1
Lead	ND		0.50	0.0019	mg/L		10/22/14 10:06	10/23/14 11:47	1
Selenium	ND		0.25	0.0040	mg/L		10/22/14 10:06	10/23/14 11:47	1
Silver	ND		0.50	0.00092	mg/L		10/22/14 10:06	10/23/14 11:47	1

Lab Sample ID: LCS 240-152752/3-A
Matrix: Solid
Analysis Batch: 152967

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 152752

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	2.00	2.18		mg/L		109	50 - 150
Barium	2.00	1.98		mg/L		99	50 - 150
Cadmium	0.0500	0.0526	J	mg/L		105	50 - 150
Chromium	0.200	0.200	J	mg/L		100	50 - 150
Lead	0.500	0.450	J	mg/L		90	50 - 150
Selenium	2.00	2.27		mg/L		113	50 - 150
Silver	0.0500	0.0581	J	mg/L		116	50 - 150

Lab Sample ID: LB 240-152646/1-B
Matrix: Solid
Analysis Batch: 152967

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 152752

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.50	0.0029	mg/L		10/22/14 10:06	10/23/14 11:43	1
Barium	0.0275	J	0.10	0.0010	mg/L		10/22/14 10:06	10/23/14 11:43	1
Cadmium	ND		0.10	0.00014	mg/L		10/22/14 10:06	10/23/14 11:43	1
Chromium	0.00173	J	0.50	0.00055	mg/L		10/22/14 10:06	10/23/14 11:43	1
Lead	ND		0.50	0.0019	mg/L		10/22/14 10:06	10/23/14 11:43	1
Selenium	ND		0.25	0.0040	mg/L		10/22/14 10:06	10/23/14 11:43	1
Silver	ND		0.50	0.00092	mg/L		10/22/14 10:06	10/23/14 11:43	1

Lab Sample ID: 240-43288-1 MS
Matrix: Solid
Analysis Batch: 152967

Client Sample ID: CHLL-DRUMWC-101514
Prep Type: TCLP
Prep Batch: 152752

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.0076	J	5.00	5.16		mg/L		103	50 - 150
Cadmium	0.070	J	1.00	1.06		mg/L		99	50 - 150
Chromium	0.0018	J B	5.00	4.92		mg/L		98	50 - 150
Selenium	0.0077	J	1.00	1.04	J	mg/L		103	50 - 150
Silver	0.0036	J	1.00	1.02	J	mg/L		101	50 - 150

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: 240-43288-1 MS — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 152967 — **Prep Batch: 152752**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	27	B	50.0	78.0		mg/L		103	50 - 150
Lead	800		5.00	797	4	mg/L		-133	50 - 150

Lab Sample ID: 240-43288-1 MSD — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 152967 — **Prep Batch: 152752**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.0076	J	5.00	5.14		mg/L		103	50 - 150	0	20
Cadmium	0.070	J	1.00	1.06		mg/L		99	50 - 150	0	20
Chromium	0.0018	J B	5.00	4.93		mg/L		99	50 - 150	0	20
Selenium	0.0077	J	1.00	1.04	J	mg/L		104	50 - 150	0	20
Silver	0.0036	J	1.00	1.02	J	mg/L		101	50 - 150	0	20

Lab Sample ID: 240-43288-1 MSD — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 152967 — **Prep Batch: 152752**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	27	B	50.0	78.0		mg/L		103	50 - 150	0	20
Lead	800		5.00	809	4	mg/L		116	50 - 150	2	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 240-152755/2-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 153429 — **Prep Batch: 152755**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	0.000090	mg/L		10/22/14 10:12	10/25/14 11:42	1

Lab Sample ID: LCS 240-152755/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 153429 — **Prep Batch: 152755**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00500	0.00498		mg/L		100	50 - 150

Lab Sample ID: LB 240-152646/1-C — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 153429 — **Prep Batch: 152755**

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	0.000090	mg/L		10/22/14 10:12	10/25/14 11:40	1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: 240-43288-1 MS — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 153429 — **Prep Batch: 152755**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	ND		0.00500	0.00504		mg/L		101	50 - 150

Lab Sample ID: 240-43288-1 MSD — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: TCLP**
Analysis Batch: 153429 — **Prep Batch: 152755**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00500	0.00498		mg/L		100	50 - 150	1	20

Method: 9012A - Cyanide, Total and/or Amenable

Lab Sample ID: MB 240-152769/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 152835 — **Prep Batch: 152769**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.48	0.29	mg/Kg		10/22/14 11:11	10/22/14 13:34	1

Lab Sample ID: LCS 240-152769/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 152835 — **Prep Batch: 152769**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	9.03	8.36		mg/Kg		93	68 - 123

Method: 9034 - Sulfide, Acid soluble and Insoluble (Titrimetric)

Lab Sample ID: MB 240-152692/8-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 152784 — **Prep Batch: 152692**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfide	ND		30	22	mg/Kg		10/22/14 07:53	10/22/14 07:53	1

Lab Sample ID: LCS 240-152692/9-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 152784 — **Prep Batch: 152692**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	85.3	74.7		mg/Kg		88	70 - 130

Lab Sample ID: 240-43288-1 MS — **Client Sample ID: CHLL-DRUMWC-101514**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 152784 — **Prep Batch: 152692**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfide	ND		103	ND	F1	mg/Kg	☼	0	10 - 154

Method: 9034 - Sulfide, Acid soluble and Insoluble (Titrimetric) (Continued)

Lab Sample ID: 240-43288-1 MSD
Matrix: Solid
Analysis Batch: 152784

Client Sample ID: CHLL-DRUMWC-101514
Prep Type: Total/NA
Prep Batch: 152692

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfide	ND		102	ND	F1	mg/Kg	☼	0	10 - 154	NC	20

GC/MS VOA

Leach Batch: 152648

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	1311	
LB 240-152648/1-A MB	Method Blank	TCLP	Solid	1311	

Analysis Batch: 152831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	8260B	152648
LB 240-152648/1-A MB	Method Blank	TCLP	Solid	8260B	152648
LCS 240-152831/8	Lab Control Sample	Total/NA	Solid	8260B	

Metals

Leach Batch: 152646

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	1311	
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	1311	
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	1311	
LB 240-152646/1-B	Method Blank	TCLP	Solid	1311	
LB 240-152646/1-C	Method Blank	TCLP	Solid	1311	

Prep Batch: 152752

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	3010A	152646
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	3010A	152646
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	3010A	152646
LB 240-152646/1-B	Method Blank	TCLP	Solid	3010A	152646
LCS 240-152752/3-A	Lab Control Sample	Total/NA	Solid	3010A	
MB 240-152752/2-A	Method Blank	Total/NA	Solid	3010A	

Prep Batch: 152755

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152646
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152646
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152646
LB 240-152646/1-C	Method Blank	TCLP	Solid	7470A	152646
LCS 240-152755/3-A	Lab Control Sample	Total/NA	Solid	7470A	
MB 240-152755/2-A	Method Blank	Total/NA	Solid	7470A	

Analysis Batch: 152967

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	6010B	152752
LB 240-152646/1-B	Method Blank	TCLP	Solid	6010B	152752
LCS 240-152752/3-A	Lab Control Sample	Total/NA	Solid	6010B	152752
MB 240-152752/2-A	Method Blank	Total/NA	Solid	6010B	152752

Metals (Continued)

Analysis Batch: 153429

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152755
240-43288-1 MS	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152755
240-43288-1 MSD	CHLL-DRUMWC-101514	TCLP	Solid	7470A	152755
LB 240-152646/1-C	Method Blank	TCLP	Solid	7470A	152755
LCS 240-152755/3-A	Lab Control Sample	Total/NA	Solid	7470A	152755
MB 240-152755/2-A	Method Blank	Total/NA	Solid	7470A	152755

General Chemistry

Analysis Batch: 152517

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	Total/NA	Solid	Moisture	

Prep Batch: 152692

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	Total/NA	Solid	9030B	
240-43288-1 MS	CHLL-DRUMWC-101514	Total/NA	Solid	9030B	
240-43288-1 MSD	CHLL-DRUMWC-101514	Total/NA	Solid	9030B	
LCS 240-152692/9-A	Lab Control Sample	Total/NA	Solid	9030B	
MB 240-152692/8-A	Method Blank	Total/NA	Solid	9030B	

Prep Batch: 152769

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	Total/NA	Solid	9012A	
LCS 240-152769/2-A	Lab Control Sample	Total/NA	Solid	9012A	
MB 240-152769/1-A	Method Blank	Total/NA	Solid	9012A	

Analysis Batch: 152784

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	Total/NA	Solid	9034	152692
240-43288-1 MS	CHLL-DRUMWC-101514	Total/NA	Solid	9034	152692
240-43288-1 MSD	CHLL-DRUMWC-101514	Total/NA	Solid	9034	152692
LCS 240-152692/9-A	Lab Control Sample	Total/NA	Solid	9034	152692
MB 240-152692/8-A	Method Blank	Total/NA	Solid	9034	152692

Analysis Batch: 152835

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-43288-1	CHLL-DRUMWC-101514	Total/NA	Solid	9012A	152769
LCS 240-152769/2-A	Lab Control Sample	Total/NA	Solid	9012A	152769
MB 240-152769/1-A	Method Blank	Total/NA	Solid	9012A	152769

Lab Chronicle

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Client Sample ID: CHLL-DRUMWC-101514
Date Collected: 10/15/14 15:50
Date Received: 10/18/14 09:30

Lab Sample ID: 240-43288-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			152648	10/21/14 17:20	DRJ	TAL CAN
TCLP	Analysis	8260B		1	152831	10/22/14 18:12	TJL1	TAL CAN
TCLP	Leach	1311			152646	10/21/14 16:00	DRJ	TAL CAN
TCLP	Prep	3010A			152752	10/22/14 10:06	WAL	TAL CAN
TCLP	Analysis	6010B		1	152967	10/23/14 12:03	ADS	TAL CAN
TCLP	Leach	1311			152646	10/21/14 16:00	DRJ	TAL CAN
TCLP	Prep	3010A			152752	10/22/14 10:06	WAL	TAL CAN
TCLP	Analysis	6010B		100	152967	10/23/14 15:54	ADS	TAL CAN
TCLP	Leach	1311			152646	10/21/14 16:00	DRJ	TAL CAN
TCLP	Prep	7470A			152755	10/22/14 10:12	WAL	TAL CAN
TCLP	Analysis	7470A		1	153429	10/25/14 11:48	AMM2	TAL CAN
Total/NA	Prep	9012A			152769	10/22/14 11:11	SEM	TAL CAN
Total/NA	Analysis	9012A		1	152835	10/22/14 13:39	SEM	TAL CAN
Total/NA	Analysis	9034		1	152784	10/22/14 07:53	BLW	TAL CAN
Total/NA	Prep	9030B			152692	10/22/14 07:53	BLW	TAL CAN
Total/NA	Analysis	Moisture		1	152517	10/21/14 09:17	SEM	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Certification Summary

Client: Michigan Dept of Environmental Quality
Project/Site: Abandoned Mining Waste-Torch Lake

TestAmerica Job ID: 240-43288-1

Laboratory: TestAmerica Canton

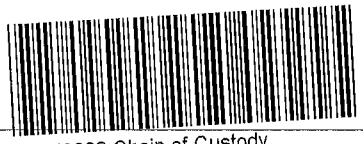
All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	NELAP	9	01144CA	06-30-14 *
California	State Program	9	2927	04-30-15
Connecticut	State Program	1	PH-0590	12-31-14
Florida	NELAP	4	E87225	06-30-15
Georgia	State Program	4	N/A	06-30-15
Illinois	NELAP	5	200004	07-31-15
Kansas	NELAP	7	E-10336	01-31-15
Kentucky (UST)	State Program	4	58	06-30-15
L-A-B	DoD ELAP		L2315	07-18-16
Minnesota	NELAP	5	039-999-348	12-31-14
Nevada	State Program	9	OH-000482008A	07-31-15
New Jersey	NELAP	2	OH001	06-30-15
New York	NELAP	2	10975	03-31-15
Ohio VAP	State Program	5	CL0024	10-31-15
Pennsylvania	NELAP	3	68-00340	08-31-15
Texas	NELAP	6		08-31-15
USDA	Federal		P330-13-00319	11-26-16
Virginia	NELAP	3	460175	09-14-15
Washington	State Program	10	C971	01-12-15
West Virginia DEP	State Program	3	210	12-31-14
Wisconsin	State Program	5	999518190	08-31-15

* Certification renewal pending - certification considered valid.

TestAmerica Laboratories, Inc.

CHAIN OF CUSTODY
AND
RECEIVING DOCUMENTS



240-43288 Chain of Custody

4101 Shuffel Street, N.W. North Canton, OH 44720 **tel** 330.497.9396 **fax** 330.497.0772 **www.testamericainc.com**

DEQ

3.8

Michigan Department of Environmental Quality
Laboratory Services Section

Analysis Request Sheet

1 OF 3

Lab Work Order Number	Project Name	Matrix
1410132	ABANDONED MINING WASTES - TORCH LAKE NS SITE	SOIL/SEDIMENT

Site Code/Project Number	AY	CC Email 1	Project TAT Days	Sample Collector
31 0000 098	13	j.binkley@WESTONSOLUTIONS.com	STD	D LIEBAU
Dept-Division-District	**Index**	**CC Email 2**	**Project Due Date**	**Sample Collector Phone**
DEQ-ERD-UP	44251			906-370-0524
State Project Manager	**PCA**	**CC Email 3**		**Contract Firm**
AMY KERANEN	30872			WESTON SOLUTIONS
State Project Manager Email	**Project**	**Overflow Lab Choice 1**	**Accept Analysis hold time codes**	**Contract Firm Primary Contact**
KERANENA@	456990	Test America	NO	JEFF BINKLEY
State Project Manager Phone	**Phase**	**Overflow Lab Choice 2**		**Primary Contact Phone**
906-337-0389	00			906-523-5457

	Lab Use Only	Field Sample Identification	Collection Date	Collection Time	Container Count	Comments
1	01	CHL-SS01-101514	10/15/14	1401	1802	
2	02	CHL-SS02-101514		1413	1	
3	03	CHL-SS03-101514		1346	1	
4	04	CHL-SS04-101514		1430	2802 40ML	
5	05	CHL-SS05-101514		1445	1	
6	06	CHL-SS06-101514		1450	1	
7	07	CHL-SS07-101514		1517	1	
8		~~CHL-SS08-101514~~			DL	
9		~~CHL-SS09-101514~~			DL	
10		CHL-DRUMWC-101514		1550		WASTE CHARACTERIZATION

ORGANIC CHEMISTRY

VOA - Volatile Organic Acidic
- Volatiles - Full List: 1 2 3 4 5 6 7 8 9 10
- BTEX/MTBE/TMB only: 1 2 3 4 5 6 7 8 9 10
- Chlorinated only: 1 2 3 4 5 6 7 8 9 10
- GRO: 1 2 3 4 5 6 7 8 9 10
- 1,4 Dioxane: 1 2 3 4 5 6 7 8 9 10

OS - Pesticides, PCBs
- Pesticides & PCBs: 1 2 3 4 5 6 7 8 9 10
- Pesticides only: 1 2 3 4 5 6 7 8 9 10
- PCBs only: 1 2 3 4 5 6 7 8 9 10
- Toxaphene: 1 2 3 4 5 6 7 8 9 10

BNA - Base Neutral Acids
- BNAs: 1 2 3 4 5 6 7 8 9 10
- PNAs only: 1 2 3 4 5 6 7 8 9 10
- BNs only: 1 2 3 4 5 6 7 8 9 10

Organic Specialty Requests
- Library search - Volatiles: 1 2 3 4 5 6 7 8 9 10
- Library search - SemiVols: 1 2 3 4 5 6 7 8 9 10
- Finger Print: 1 2 3 4 5 6 7 8 9 10
- DRO / ORO: 1 2 3 4 5 6 7 8 9 10

METALS CHEMISTRY PACKAGES
- OpMemo2 - Total: 1 2 3 4 5 6 7 8 9 10 (Sb,As,Ba,Be,Cd,Cr,Cu,Co,Fe,Pb,Mn,Hg,Mo,Ni,Se,Ag,Tl,V,Zn)
- Michigan10 - Total: 1 2 3 4 5 6 7 8 9 10 (As,Ba,Cd,Cr,Cu,Pb,Hg,Se,Ag,Zn)

MS - TOTAL METALS
- Silver - Ag: 1 2 3 4 5 6 7 8 9 10
- Aluminum - Al: 1 2 3 4 5 6 7 8 9 10
- Arsenic - As: 1 2 3 4 5 6 7 8 9 10
- Barium - Ba: 1 2 3 4 5 6 7 8 9 10
- Beryllium - Be: 1 2 3 4 5 6 7 8 9 10
- Cadmium - Cd: 1 2 3 4 5 6 7 8 9 10
- Cobalt - Co: 1 2 3 4 5 6 7 8 9 10
- Chromium - Cr: 1 2 3 4 5 6 7 8 9 10
- Copper - Cu: 1 2 3 4 5 6 7 8 9 10
- Iron - Fe: 1 2 3 4 5 6 7 8 9 10
- Mercury - Hg: 1 2 3 4 5 6 7 8 9 10
- Lithium - Li: 1 2 3 4 5 6 7 8 9 10
- Manganese - Mn: 1 2 3 4 5 6 7 8 9 10
- Molybdenum - Mo: 1 2 3 4 5 6 7 8 9 10
- Nickel - Ni: 1 2 3 4 5 6 7 8 9 10
- Lead - Pb: 1 2 3 4 5 6 7 8 9 10
- Antimony - Sb: 1 2 3 4 5 6 7 8 9 10
- Selenium - Se: 1 2 3 4 5 6 7 8 9 10
- Strontium - Sr: 1 2 3 4 5 6 7 8 9 10
- Titanium - Ti: 1 2 3 4 5 6 7 8 9 10
- Thallium - Tl: 1 2 3 4 5 6 7 8 9 10
- Vanadium - V: 1 2 3 4 5 6 7 8 9 10
- Zinc - Zn: 1 2 3 4 5 6 7 8 9 10
- Calcium - Ca: 1 2 3 4 5 6 7 8 9 10
- Potassium - K: 1 2 3 4 5 6 7 8 9 10
- Magnesium - Mg: 1 2 3 4 5 6 7 8 9 10
- Sodium - Na: 1 2 3 4 5 6 7 8 9 10

GENERAL CHEMISTRY
- GS - General Chemistry
- Total Cyanide - CN: 1 2 3 4 5 6 7 8 9 10
- Available Cyanide - CN: 1 2 3 4 5 6 7 8 9 10
- Chem Oxyg Dem - COD: 1 2 3 4 5 6 7 8 9 10
- Total Org Carbon - TOC: 1 2 3 4 5 6 7 8 9 10
- Kjeldahl Nitrogen - KN: 1 2 3 4 5 6 7 8 9 10
- Total Phosphorus - TP: 1 2 3 4 5 6 7 8 9 10

TCLP VOCs (10)
TCLP METALS (10)
Sulfide - reactivity
Cyanide - reactivity

Chain of Custody

	Relinquished by	Received By	Date / Time
Print Name & Org.	DANIEL LIEBAU 10/16/14 1500	FEDEX	
Signature:		8496 7354 5 7134	
Print Name & Org.	Fedex	Jordan Handley DEQ	mm 10/17/14
Signature:			
Print Name & Org.	Melissa Smith	Gary Schafer	
Signature:			
	10/17 16:35	Dakota Turner TA-Canton	10-18-14 9:30

DEQ Laboratory Services Section
Phone: 517-335-9600

Page of

www.michigan.gov/deq
EQP4013 (7/2C

TestAmerica Canton Sample Receipt Form/Narrative
Canton Facility

Login # : 43286

Client Michigan Department of Env. Quality Site Name

Cooler Received on 10-18-14 Opened on 10-18-14

Cooler unpacked by:

FedEx: 1st Grd Exp UPS FAS Stetson Client Drop Off TestAmerica Courier Other

TestAmerica Cooler # Foam Box Client Cooler Box Other

Packing material used: Bubble Wrap Foam Plastic Bag None Other

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt

IR GUN# A	(CF +2 °C)	Observed Cooler Temp. ____ °C	Corrected Cooler Temp. ____ °C	
IR GUN# 4	(CF -2 °C)	Observed Cooler Temp. ____ °C	Corrected Cooler Temp. ____ °C	☐ See Multiple Cooler Form
IR GUN# 5	(CF 0 °C)	Observed Cooler Temp. ____ °C	Corrected Cooler Temp. ____ °C	
IR GUN# 8	(CF 0 °C)	Observed Cooler Temp. 3.8 °C	Corrected Cooler Temp. 3.8 °C	

2. Were custody seals on the outside of the cooler(s)? If Yes Quantity ____ Yes No
   -Were custody seals on the outside of the cooler(s) signed & dated? Yes No NA
   -Were custody seals on the bottle(s)? Yes No
3. Shippers' packing slip attached to the cooler(s)? Yes No
4. Did custody papers accompany the sample(s)? Yes No
5. Were the custody papers relinquished & signed in the appropriate place? Yes No
6. Did all bottles arrive in good condition (Unbroken)? Yes No
7. Could all bottle labels be reconciled with the COC? Yes No
8. Were correct bottle(s) used for the test(s) indicated? Yes No
9. Sufficient quantity received to perform indicated analyses? Yes No
10. Were sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# HC412469
11. Were VOAs on the COC? Yes No
12. Were air bubbles >6 mm in any VOA vials? Yes No NA
13. Was a trip blank present in the cooler(s)? Yes No

Contacted PM ____ Date ____ by ____ via Verbal Voice Mail Other

Concerning ____

14. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by:

15. SAMPLE CONDITION

Sample(s) ____ were received after the recommended holding time had expired.

Sample(s) ____ were received in a broken container.

Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

16. SAMPLE PRESERVATION

Sample(s) ____ were further preserved in the laboratory.

Time preserved: ____ Preservative(s) added/Lot number(s): ____