Known for excellence. Built on trust.

Understanding Collected Data

NEWMOA Workshop

Date: June 20, 2023

Rick Carlone, Associate Principal
GZA, GeoEnvironmental, Inc.

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Framework

Site Assessment

Site Investigation Planning

Understanding the Data

Data Usability and Presentation

Updating the CSM

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Agenda

- Useable Data
- Field Documentation
- Laboratory Data

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Field Preparation

- Site Access
- Health and Safety Plan
- Equipment-Inhouse or Rental
- Subcontractor Coordination
- Laboratory Coordination
  - Data Quality Objectives
  - QC Samples
  - Turnaround Time
  - Bottle Order

Be Prepared and Think about Contingency Plans

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Project Kickoff

- Review Site Assessment/CSM
- Review Scope/Work Plan
- Review Objectives
- Review Documentation Requirements
- Communication/Decision Plan
- Training Requirements

Project Staff Should have a Full Understanding of the Scope/Objectives and be Invested in Project

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Field Book

- Date/time
- Weather
- Personnel Onsite
- Subcontractors
- Equipment
- Sampling details (time, location, etc.)
- Equipment Calibration
- Observations
- QC Samples
- Deviations from Work Plan

Write Everything Down, if you Don't You will Forget What Happened. Field Notes are the Record of What Occurred

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Site Sketch and Photographs

- Prepare Field Sketches Either in Field Book or on a Printed Plan
- Include Dimensions, Landmarks and Distances from Fixed Points
- Take lots of Photographs
  - Samples
  - Equipment
  - Materials
  - Anything Notable

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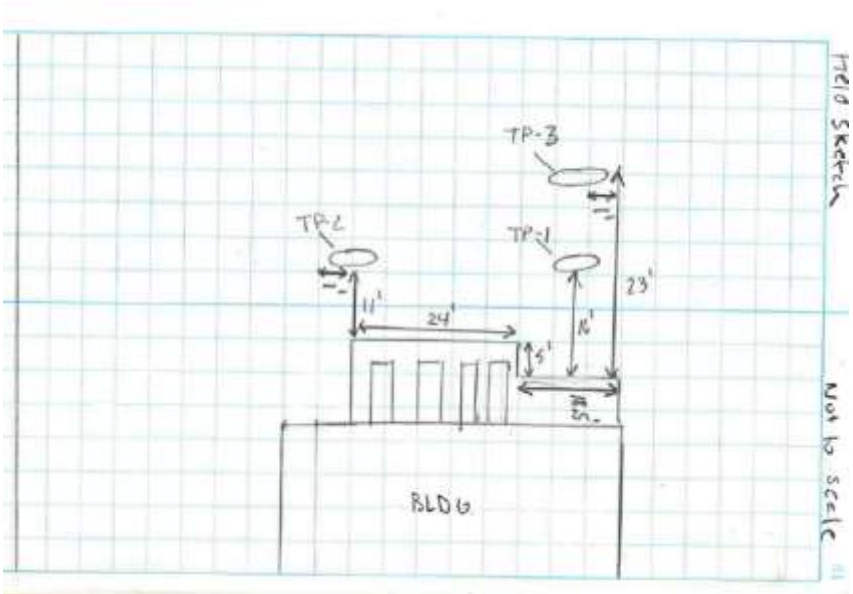

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Boring Logs

- Soil Stratum Description/Classification
- Soil Recovery
- PID Screening results
- Color
- Moisture Content
- Evidence of Contamination
- Laboratory Sample Locations
- Well Construction Details

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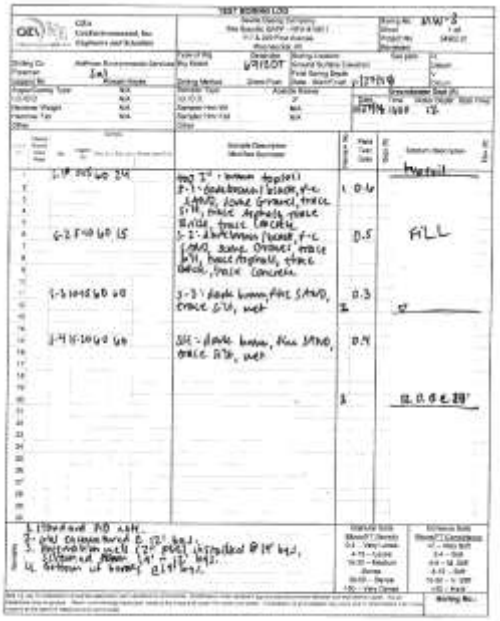
TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

FILL

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TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

12


TEST BORING LOG

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HYDROGEOLOGIC LOG FOR BCW-PM2
PAGA MINE PROJECT SITE
BARTOW COUNTY, GEORGIA

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Low Flow Logs

- Completeness
- IDs, Dates, Project Information
- Depth to Water and Volumes
- Changes in Depth to Water
- Equilibrated Geochemical Parameters
- Pump/Tubing Depth
- Purge Rates
- Well Condition

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Low Flow Logs

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Low Flow Logs

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Soil Vapor Testing

- Leak Testing
- Sample Collection Time
- Vacuum

Client Sample ID	Sampling Start Time	Sampling End Time	Sample Start Date	Canister Pressure at Start (" Hg)	Canister Pressure at End (" Hg)	Soil Gas	TO-15
	TEST SECTION FOR LAB USE ONLY					MATRIX	ANALYSIS
S6-1	10:04	12:34	5/31/23	-27	-5	X	X
S6-2	11:58	11:34	5/31/23	-29	-10	X	X

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Chain of Custody

- Fill Out Completely
- All Analysis Spelled Out
- Metals List
- Project Number
- Turn Around Time
- Distribution List
- State Requirements
- Project Specific Requirements/Reporting Limits

The Chain of Custody is Your Contract with the Laboratory

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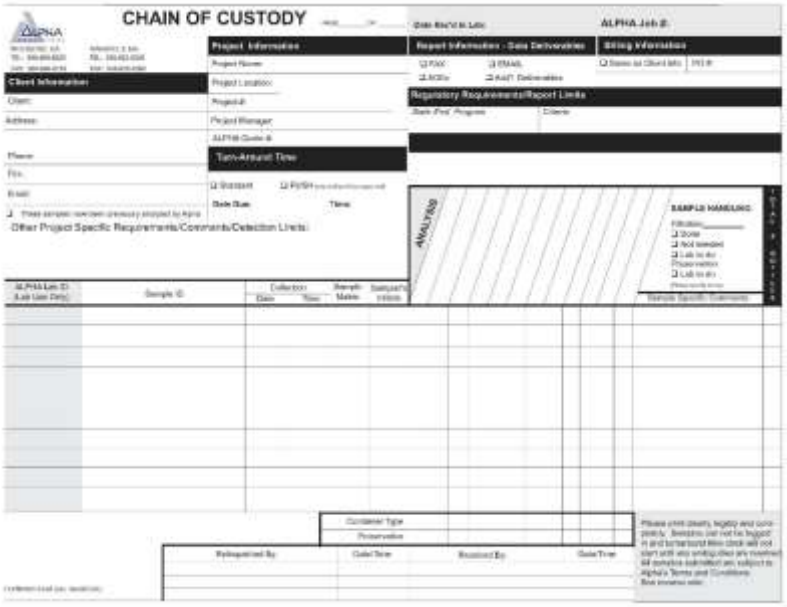

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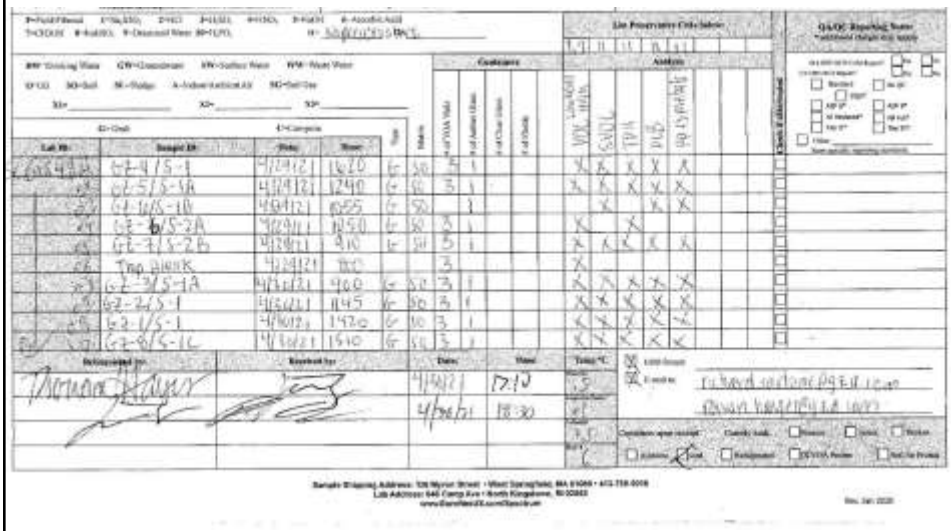

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Before You Leave the Site

- All Documentation Filled Out
- Verify Samples-Cross Check Notes, Labels, COC and QAPP
- Calibration Check
- End of Day Field Notes
- Cleanup
- Secure Site

Check in Before Leaving

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Laboratory Sample Confirmation

- Check it When It Comes In
- Confirm with COC and Work Plan/QAPP
- Type of Report-Typically Level 2
- Required Criteria

The Easiest Time to Make Changes is Now

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Laboratory Sample Confirmation


[EXTERNAL] 23D0593 Sample Confirmation

Attached is the sample confirmation for project: Westerly Marina

Please do not reply to this e-mail. This message came from an automated mailbox.

PLEASE NOTIFY THE LABORATORY IMMEDIATELY IF THERE ARE POINT OF CONTACT CHANGES FOR THIS PROJECT.

If you have any questions, please contact ESS Project Management

For samples that are put on hold: ESS will create a work order and an invoice for On Hold and Disposal fees. These fees are on a per container basis.
Invoice and samples will be held for 60 days and then samples will be disposed and invoice sent. No notification will be sent.
If client removes sample from hold for analysis, a reprocess fee will be added to the work order.
If client contacts ESS to hold samples further - ESS will create another work order and invoice for On Hold fees for the next 30 days.
ESS is not responsible for notification of disposal of samples or of tracking hold times of analyses on samples that are placed "on hold."

*** Client Connect allows 24 hour access to real time data and work order status as well as PDF reports, EDDs, and invoices. Please click here or contact your Project Manager for more information or help logging in. ***

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Laboratory Sample Confirmation

Project Manager:	Agnes R Huntley		Suite 300 Providence, RI 02909
Job Due Date:	11/9/2021		
Job TAT:	7 Days		
Max Deliverable Level:	4	**Bill To:**	GZA GeoEnvironmental, Inc. Accounts Payable 188 Valley St Suite 300 Providence, RI 02909
Earliest Deliverable Due:	11/9/2021		

Login 620-1707

Sample Receipt:	10/29/2021 12:53:00 PM	**Number of Coolers:**	1
Method of Delivery:	Client Drop off	**Cooler Temperature(s) (C°):**	9.2,

Lab Sample # / Method	Client Sample ID / Method Description / Work Location	Date Sampled	Matrix / Rpt Basis	Dry / Wet **
620-1707-1	**GZ-101**	**10/29/2021 10:15:00 AM**	**Solid**	
9012B	Cyanide, Total and/or Amenable / Eurofins TestAmerica, Edison		Total	Dry
9016	Cyanide, Free / Eurofins TestAmerica, Edison		Total	Dry
Moisture	Percent Moisture / Eurofins TestAmerica, Edison		Total	Wet
620-1707-2	**GZ-102**	**10/29/2021 10:25:00 AM**	**Solid**	
9012B	Cyanide, Total and/or Amenable / Eurofins TestAmerica, Edison		Total	Dry
9016	Cyanide, Free / Eurofins TestAmerica, Edison		Total	Dry
Moisture	Percent Moisture / Eurofins TestAmerica, Edison		Total	Wet

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Laboratory Report

- Review the Data When It Comes In
- Look For Potential Anomalies
- Need for Any Additional Analysis-TCLP

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Laboratory Report

ESS Laboratory

BAL Laboratory

REVIEWED

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Laboratory Case Narrative

- Significant Observations
- Anything that Impacts Data Quality from the Laboratory's Perspective
- Hold Times
- Preservation
- QC Data

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Laboratory Case Narrative

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 99 India Street

ESS Laboratory Work Order: 20A0454

PROJECT NARRATIVE

SHSS/8260B Volatile Organic Compounds / Methanol

20A0454-01 Surrogate recovery(ies) above upper control limit (S+).
1,2-Dichloroethane-d4 (207% @ 70-130%), 4-Bromofluorobenzene (280% @ 70-130%), Dibromofluoromethane (218% @ 70-130%), Toluene-d8 (281% @ 70-130%)

20A0454-07 Surrogate recovery(ies) above upper control limit (S+).
1,2-Dichloroethane-d4 (144% @ 70-130%), 4-Bromofluorobenzene (144% @ 70-130%), Dibromofluoromethane (148% @ 70-130%), Toluene-d8 (149% @ 70-130%)

20A0454-09 Surrogate recovery(ies) above upper control limit (S+).
1,2-Dichloroethane-d4 (133% @ 70-130%), Dibromofluoromethane (131% @ 70-130%)

20A0454-10 Surrogate recovery(ies) above upper control limit (S+).
1,2-Dichloroethane-d4 (135% @ 70-130%), 4-Bromofluorobenzene (131% @ 70-130%), Dibromofluoromethane (143% @ 70-130%), Toluene-d8 (136% @ 70-130%)

[MA0825-CCV] Continuing Calibration %Diff/Drift is below control limit (CD-).
1,4-Dioxane - Screen (38% @ 30%)

[MA0754-BSD] Blank Spike recovery is below lower control limit (R-).
1,2-Dibromo-3-Chloropropane (67% @ 70-130%)

Total Metals

20A0454-01 Elevated Method Reporting Limits due to sample matrix (EL).
Silver

20A0454-05 Elevated Method Reporting Limits due to sample matrix (EL).
Silver

20A0454-06 Elevated Method Reporting Limits due to sample matrix (EL).
Silver

No other observations noted.

End of Project Narrative.

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Laboratory Report-Results

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 99 India Street
Client Sample ID: GZ-1 S-1A
Date Sampled: 01/16/20 09:00
Percent Solids: 90

ESS Laboratory Work Order: 20A0454
ESS Laboratory Sample ID: 20A0454-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Antimony	ND (5.06)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Arsenic	**4.30** (2.53)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Beryllium	ND (0.11)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Cadmium	ND (0.51)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Chromium	**10.9** (1.01)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Copper	**26.0** (2.53)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Lead	**33.7** (5.06)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Mercury	**0.150** (0.030)		7471B		1	MKS	01/20/20 10:03	0.74	40	DA01745
Nickel	**10.6** (2.53)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648
Selenium	ND (5.06)		6010C		1	KJK	01/17/20 18:56	2.19	100	DA01648

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Laboratory Report-Data Qualifiers

Qualifier	Definition
U	Not Detected
J	Estimated Value between RL and MDL
D	Sample was Diluted
B	Detected in Method Blank
E	Exceeds Calibration Limit

Reporting Limit-Lowest Concentration Reportable by the Laboratory

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Laboratory Report-Data Qualifiers

Analyte	Results (MRL)	MDL	Method
Bromodichloromethane	ND (0.215)	0.0645	8260B
Bromodichloromethane	ND (0.215)	0.0215	8260B
Bromoform	ND (0.215)	0.0430	8260B
Bromomethane	ND (0.215)	0.0860	8260B
Carbon Disulfide	**J 0.0688** (0.215)	0.0215	8260B
Carbon Tetrachloride	ND (0.215)	0.0215	8260B
Chlorobenzene	ND (0.215)	0.0215	8260B
Chloroethane	ND (0.215)	0.0860	8260B
Chloroform	ND (0.215)	0.0430	8260B
Chloromethane	**J 0.0473** (0.215)	0.0215	8260B
cis-1,2-Dichloroethene	ND (0.215)	0.0430	8260B

Parameter	Result	Flag	Reporting Limit	Units	Analytical Method
Arsenic	4.24		1.62	mg/kg	SW846 6010C
Chromium	11.3		1.08	mg/kg	SW846 6010C
Copper	14.6		1.08	mg/kg	SW846 6010C
Lead	18.6		1.62	mg/kg	SW846 6010C
Nickel	10.1		1.08	mg/kg	SW846 6010C
Zinc	30.9		3.24	mg/kg	SW846 6010C
Total Petroleum Hydrocarbons	303	D	11	mg/kg	SW846 8100Mod.
Methylene chloride	6.31		2.42	µg/kg	SW846 8260C LLS
Toluene	7.77		2.71	µg/kg	SW846 8260C LLS

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Laboratory Report-Data Qualifiers

Client Sample ID: GZ-20 — **Lab Sample ID: 620-2268-2**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
1,1-Dichloroethene	1.74		1.00	ug/L	1		8260C	Total/NA
cis-1,2-Dichloroethene	384	E	1.00	ug/L	1		8260C	Total/NA
Tetrachloroethene	1110	E	1.00	ug/L	1		8260C	Total/NA
Trichloroethene	[illegible]	[illegible]	1.00	ug/L	1		8260C	Total/NA
Vinyl chloride	5.14		1.00	ug/L	1		8260C	Total/NA
cis-1,2-Dichloroethene - DL	283		20.0	ug/L	20		8260C	Total/NA
Tetrachloroethene - DL	1040		20.0	ug/L	20		8260C	Total/NA
Trichloroethene - DL	372		20.0	ug/L	20		8260C	Total/NA

Client Sample ID: GZ-19 — **Lab Sample ID: 620-2268-3**

Analyte	Result	Qualifier	RL	Unit	Dil Fac	D	Method	Prep Type
Tetrachloroethene	455	E	1.00	ug/L	1		8260C	Total/NA
Trichloroethene	1.29		1.00	ug/L	1		8260C	Total/NA
Tetrachloroethene - DL	364		10.0	ug/L	10		8260C	Total/NA
tert-Butanol - DL	101	B	100	ug/L	10		8260C	Total/NA

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Laboratory Report-QC Data

- Blanks
- Matrix Spike/Matrix Spike Duplicate
- Laboratory Control Samples/Laboratory Control Sample Duplicates

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Laboratory Report-QC Data

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: 99 India Street

ESS Laboratory Work Order: 20A0454

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DA01345 - 3050B										
Thallium	70.6	7.35	mg/kg wet	82.35		86	80-120	4	20	
Batch DA01345 - 7471B										
Blank										
Mercury	ND	0.033	mg/kg wet							
LCS										
Mercury	0.65	0.033	mg/kg wet	7.353		111	80-120			
LCS Dup										
Mercury	0.65	0.033	mg/kg wet	7.353		111	80-120	1	20	
5035/8260B Volatile Organic Compounds / Methanol										
Batch DA01734 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.200	mg/kg wet							
1,1,1-Trichloroethane	ND	0.200	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.200	mg/kg wet							
1,1,2-Trichloroethane	ND	0.200	mg/kg wet							
1,1-Dichloroethane	ND	0.200	mg/kg wet							
1,1-Dichloroethene	ND	0.200	mg/kg wet							
1,1-Dichloropropene	ND	0.200	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.200	mg/kg wet							
1,2,3-Trichloropropane	ND	0.200	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.200	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.200	mg/kg wet							

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Laboratory Report-QC Data

Batch DA01734 - 5035						
LCS						
1,1,1,2-Tetrachloroethane	1.84	0.200	mg/kg wet	2.000	92	70-130
1,1,1-Trichloroethane	2.08	0.200	mg/kg wet	2.000	104	70-130
1,1,2,2-Tetrachloroethane	1.82	0.200	mg/kg wet	2.000	91	70-130
1,1,2-Trichloroethane	2.00	0.200	mg/kg wet	2.000	100	70-130
1,1-Dichloroethane	2.14	0.200	mg/kg wet	2.000	107	70-130
1,1-Dichloroethene	2.15	0.200	mg/kg wet	2.000	108	70-130
1,1-Dichloropropene	2.16	0.200	mg/kg wet	2.000	108	70-130
1,2,3-Trichlorobenzene	1.67	0.200	mg/kg wet	2.000	83	70-130
1,2,3-Trichloropropane	1.69	0.200	mg/kg wet	2.000	85	70-130
1,2,4-Trichlorobenzene	1.86	0.200	mg/kg wet	2.000	93	70-130
1,2,4-Trimethylbenzene	2.04	0.200	mg/kg wet	2.000	102	70-130
1,2-Dibromo-3-Chloropropane	1.47	1.00	mg/kg wet	2.000	74	70-130
1,2-Dibromoethane	2.05	0.200	mg/kg wet	2.000	103	70-130
1,2-Dichlorobenzene	1.87	0.200	mg/kg wet	2.000	93	70-130

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Field and Trip Blanks

- Detections in Trip Blanks
- Field Blank Results Compared to Sample-Relative Percent Difference

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Anomalies

- Are the Results Unexpected?
- Consistent with Field Observations
- Results within Reason
- Consistent with Previous Results
- Rarely Observed Compounds

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Questions?

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